
Good design
makes a difference™
AIA

71 Million Square Foot Mashup of Community College Data

BIG BIM BANG

FASTEST FORWARD

Fred Harris - Assistant Vice Chancellor
California Community Colleges Chancellor's Office

Kimon Onuma, FAIA
President, ONUMA, Inc.

AIA

Good design
makes a difference™

Learning Objectives

1. Owners using BIM for the full life cycle
2. Responding to owners' needs.
3. Community College Projects
4. Open standards and cloud based BIM
5. Moving Faster Forward

ONUMA

Building Informed Environments™

Since 1976

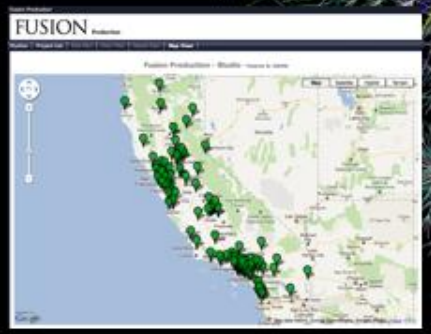
BIM since 1993

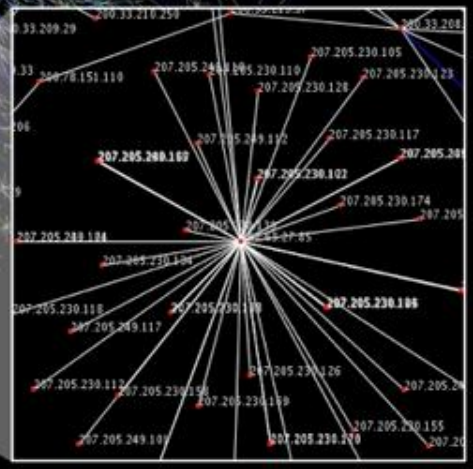
Clients:

- General Services Administration
- Army Corps of Engineers - ERDC
- US Coast Guard
- Smithsonian Institution
- Department of Homeland Security
- California Community Colleges
- K-12, & Universities
- Other Architects and Engineers

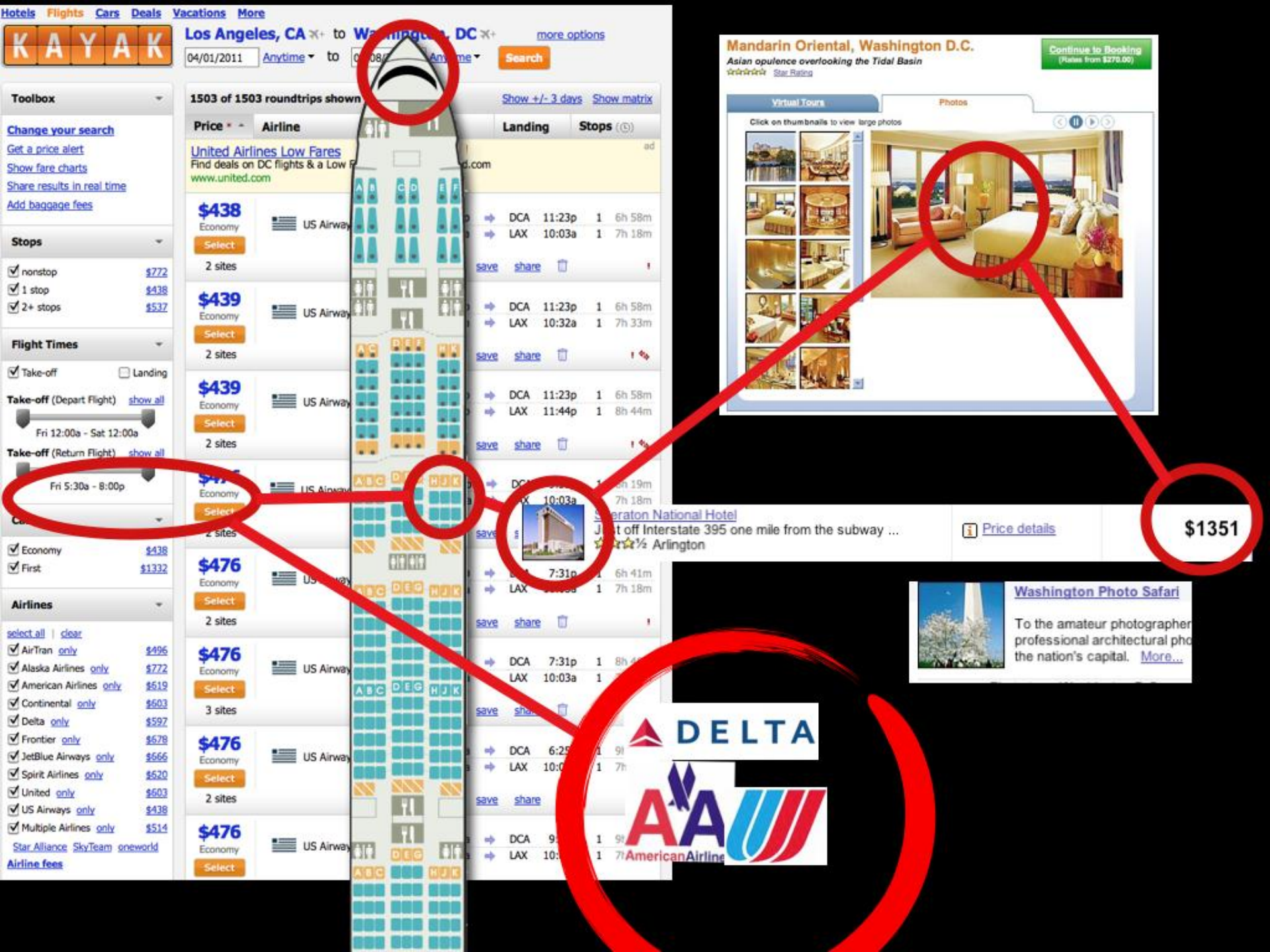
FOUNDATION *for* CALIFORNIA COMMUNITY COLLEGES

Standards & Interoperability





http://commons.wikimedia.org/wiki/File:Internet_map_1024.jpg


Hotels Flights Cars Deals Vacations More
KAYAK
Los Angeles, CA to
more options
04/01/2011 Anytime to
Search
Toolbox
Change your search
Get a price alert
Show fare charts
Share results in real time
Add baggage fees
Stops
nonstop $772
1 stop $438
2+ stops $537
Flight Times
Take-off Landing
Take-off (Depart Flight) show all
Fri 12:00a - Sat 12:00a
Take-off (Return Flight) show all
Fri 5:30a - 8:00p
Economy $438
First $1332
Airlines
select all | clear
AirTran only $496
Alaska Airlines only $772
American Airlines only $619
Continental only $603
Delta only $597
Frontier only $678
JetBlue Airways only $666
Spirit Airlines only $520
United only $603
US Airways only $438
Multiple Airlines only $514
Star Alliance SkyTeam oneworld
Airline fees
1503 of 1503 roundtrips shown
Show +/- 3 days Show matrix
Price
Airline
Landing
Stops
United Airlines Low Fares
Find deals on DC flights & a Low
www.united.com
$438 Economy Select 2 sites
$439 Economy Select 2 sites
$439 Economy Select 2 sites
$476 Economy Select 2 sites
$476 Economy Select 3 sites
$476 Economy Select 2 sites
$476 Economy Select
US Airways
DCA 11:23p 1 6h 58m
LAX 10:03a 1 7h 18m
LAX 10:32a 1 7h 33m
LAX 11:44p 1 8h 44m
LAX 7:31p 1 6h 41m
DCA 7:31p 1 8h
LAX 10:03a 1
save share
Mandarin Oriental, Washington D.C.
Asian opulence overlooking the Tidal Basin
Star Rating
Continue to Booking
Virtual Tours
Photos
Click on thumbnails to view large photos
Sheraton National Hotel
off Interstate 395 one mile from the subway ...
Arlington
Price details
$1351
Washington Photo Safari
To the amateur photographer
professional architectural pho
the nation's capital. More...
DELTA
AmericanAirlines

شكرًا... شباب مصر

FACE BOOK

صامدون لن نغادر

facebook

Map by Paul Butler http://www.facebook.com/notes/facebook-engineering/visualizing-friendships/46971639819

McKinsey Global Institute

May 2011

Big data: The next frontier for innovation, competition, and productivity

Some sectors are positioned for greater gains from the use of big data

Historical productivity growth in the United States, 2000–08

1 See appendix for detailed definitions and metrics used for value potential index.
SOURCE: US Bureau of Labor Statistics; McKinsey Global Institute analysis

Big data—a growing torrent

$600 to buy a disk drive that can store all of the world's music

5 billion mobile phones in use in 2010

30 billion pieces of content shared on Facebook every month

40% projected growth in global data generated per year vs. **5%** growth in global IT spending

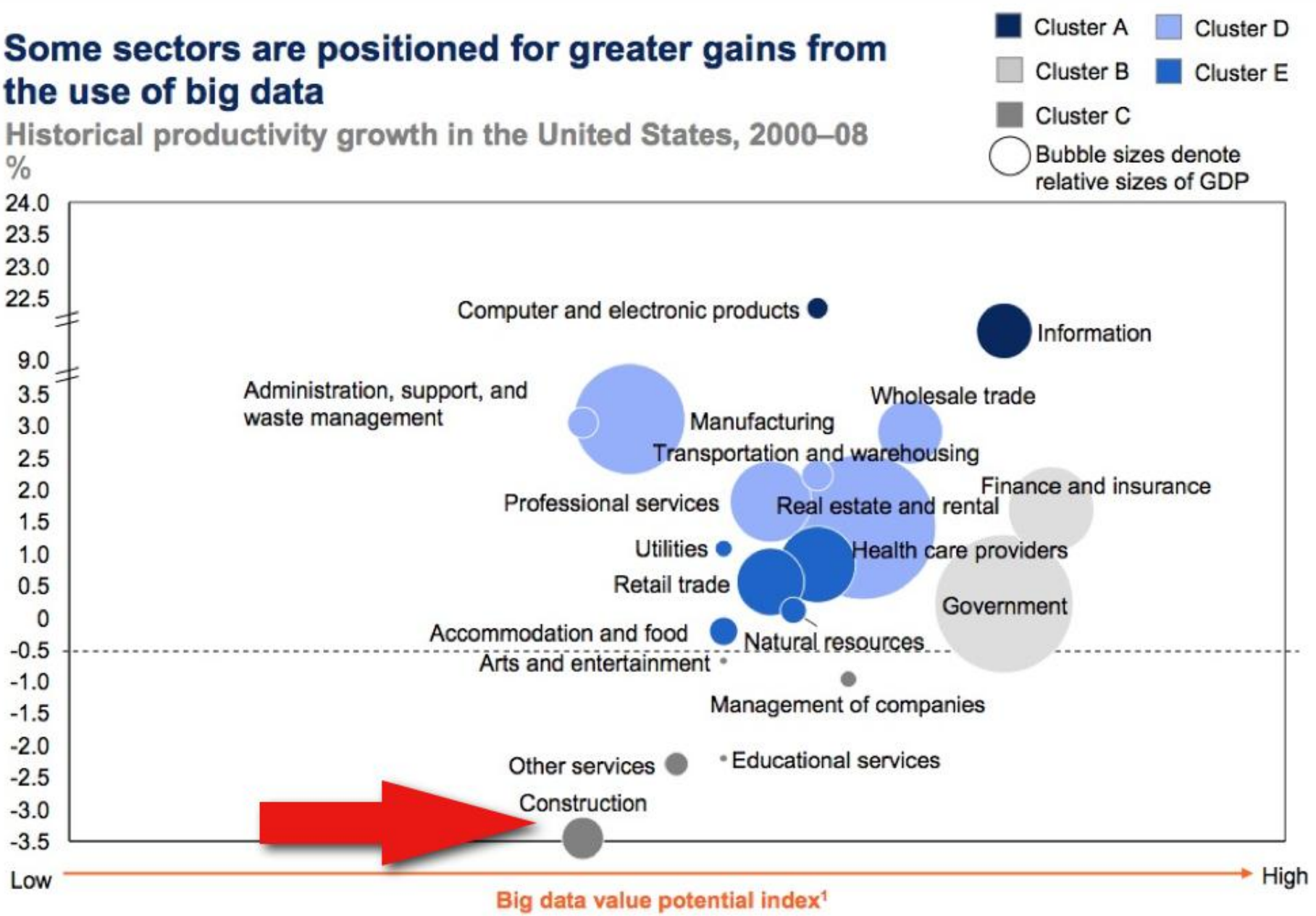
235 terabytes data collected by the US Library of Congress in April 2011

15 out of 17 sectors in the United States have more data stored per company than the US Library of Congress

Source: McKinsey Report on Big Data: The next frontier for innovation, competition and productivity

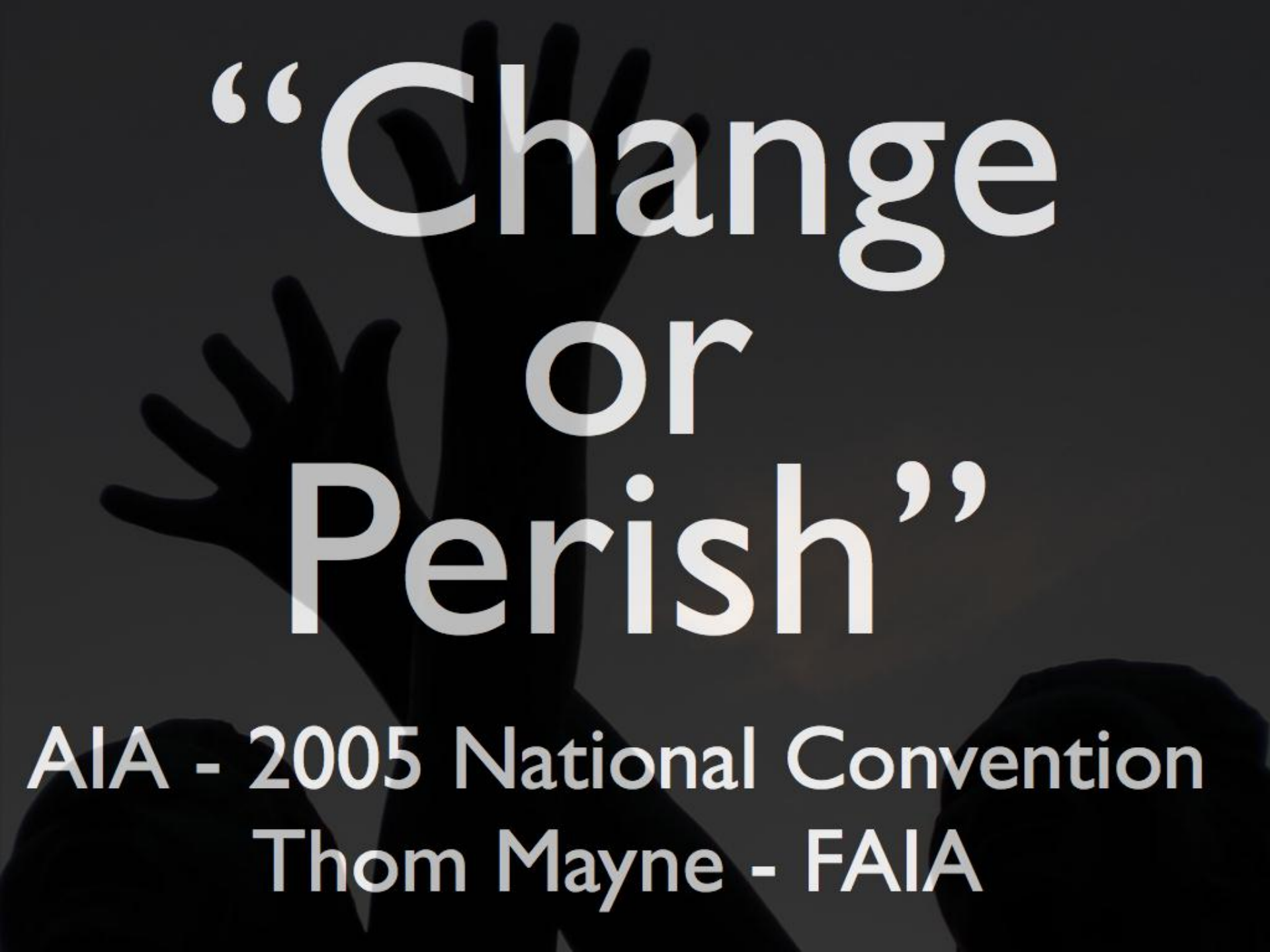
Some sectors are positioned for greater gains from the use of big data

Historical productivity growth in the United States, 2000–08

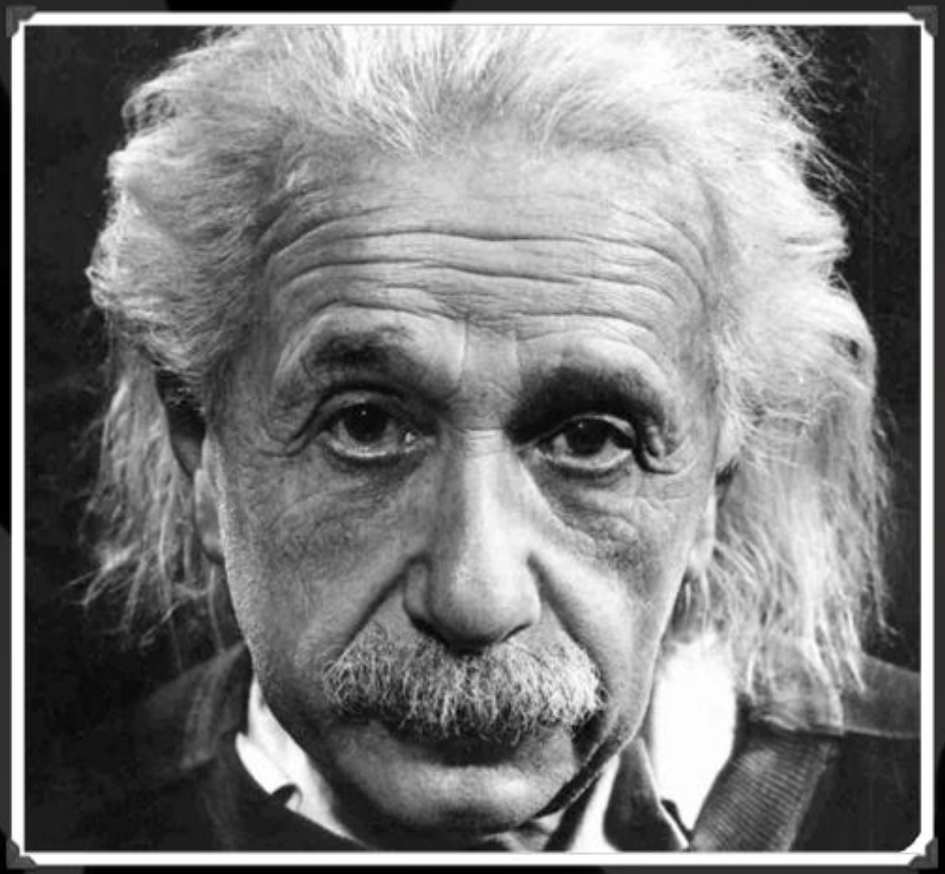


1 See appendix for detailed definitions and metrics used for value potential index.

SOURCE: US Bureau of Labor Statistics; McKinsey Global Institute analysis


"Change
or
Perish"
AIA - 2005 National Convention
Thom Mayne - FAIA

"Everything should be made as simple as possible, but not simpler."




artners


FASTEST FORWARD

Good design
makes a difference™

design

akes a diff

TAP

Technology in Architectural Practice

Good design
makes a difference™

AIA

from Greek

tekhnologia

‘systematic treatment,’ from tekhnē ‘art, craft’ + -logia - combining form

Good design
makes a difference™

AIA

FUSION Workflow with Interlinked Modules on the Web

California State Community College Web Site - Windows Internet Explorer

http://fusion.deltacollege.edu/code/admin/default.htm

FUSION Forum | California State Comm...

FUSION | Home | Assessment | Space Inventory | Planning | Project | Emanual

John Roach - District Level is signed in: Access Your Info | Sign Out

Assessment >> 1.0 Facility :: 2.0 Deficiencies

- San Bernardino
- San Diego
- San Francisco
- San Joaquin Delta
  - San Joaquin Delta College
    - ADMINISTRATIVE WING (55)
    - AUDITORIUM (60)
    - BASEBALL DUGOUT STORAG
    - BASEBALL SCORE BOOTH (6
    - BUDD CENTER (52)
    - CENTER OF MICROSCOPY &
    - CENTRAL PLANT (79)
    - CHILD DEVEL CENTER (68)
    - CITY FIRE STATION (99)
    - COTTAGE (75)
    - CUNNINGHAM CENTER (51)
    - DANNER HALL (59)
    - DERICCO (GATEWAY) (156)
    - EQUIPMENT WAREHOUSE (78
    - FIELD BUILDING (62)
    - FOOTBALL SCORE BOOTH (6
    - FORUM HALL (57)
    - GARAGE (76)
    - GOLEMAN LIBRARY (54)
    - HOLT CENTER (53)
    - LOCKE CENTER (58)
    - MANETCA CTR (FARM OFC) (
    - MANTECA CTR (FARM BARN)
    - MANTECA CTR (FARM DMGR
    - MANTECA CTR (FARM DORM)
    - MANTECA CTR (FARM FEED)

AS ENT > Facility >

00 ORUM HALL

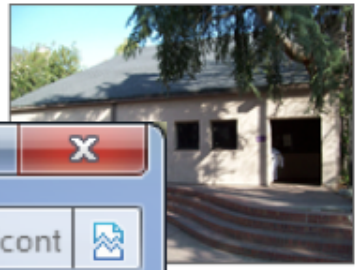
General Info:

Type: Building FCI%: 37.74%

Gross Area: 11646 S. F.

Year Built: 1975

Last Renovation:



Facility Description:

0057. Forum Hall is located ct in Stockton, CA.
The two story with partial ba nally constructed in
1975.

Structural/Exterior Closure:
The building rest on a concr facing. The roof is
wood framed with wood dec

Facility Condition - Windo...

http://fusion.deltacollege.edu/code/cont

Facility Condition:

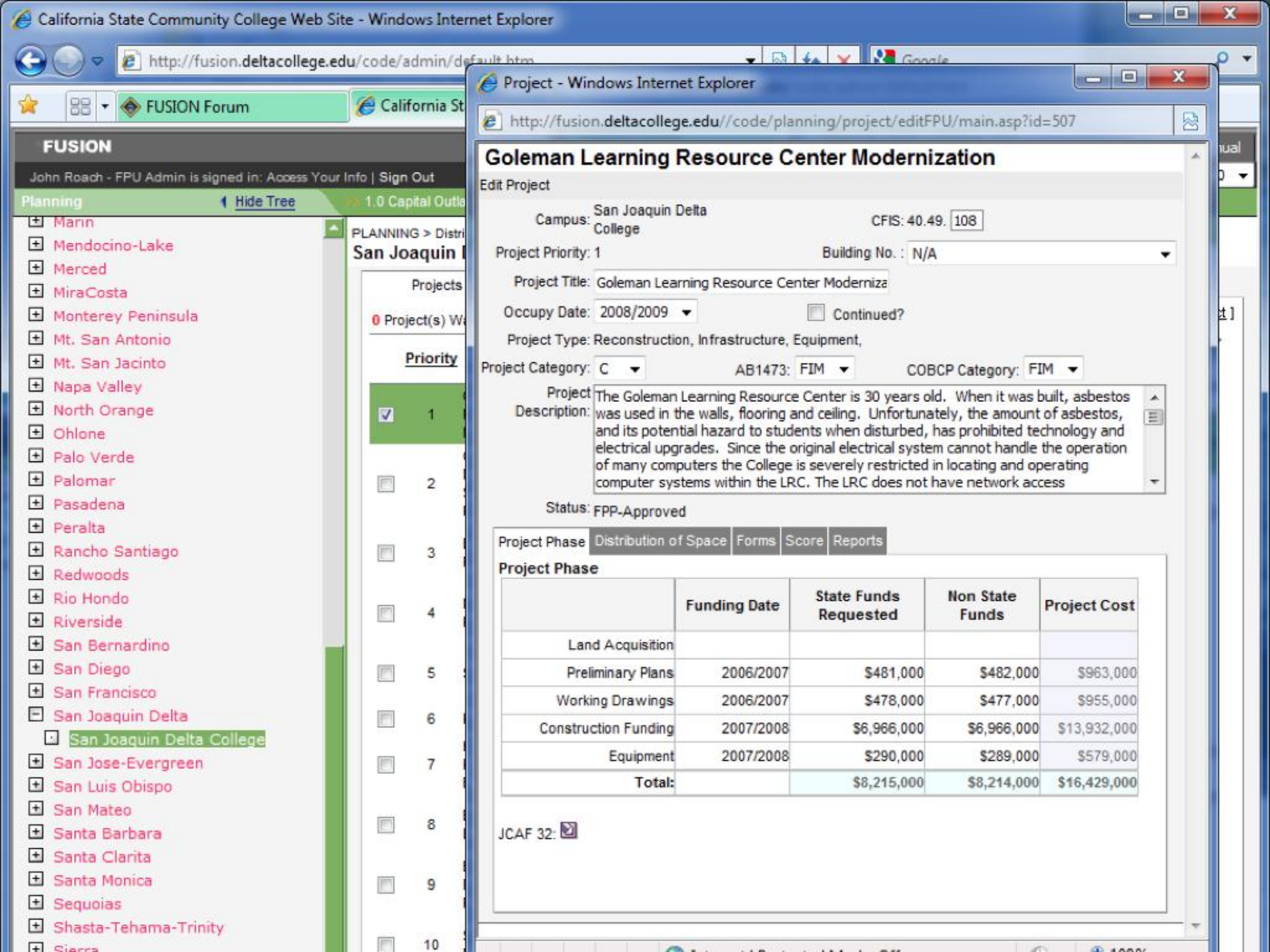
Estimate Cost:	$728,503.83
Soft Cost:	$740,366.42
Repair Cost:	$1,468,870.24
Replacement Value:	$3,891,860.28
FCI%:	37.74%

Internet | Protected 100%

Life Cycle:

Cost Model: CC Admin MSwC

System							Adjust Amount
A1030 Slab on Grade	$0.00	100	100%	35%	1	1	$0.00
B1020 Roof Construction	$0.00	100	120%	35%	1	1	$0.00
B1010 Floor Construction	$0.00	100	100%	35%	1	1	$0.00
B2020 Exterior Windows	$0.00	35	105%	100%	1	1	$0.00
B2030 Exterior Doors	$0.00	30	105%	100%	1	1	$0.00
B2010 Exterior Walls	$0.00	100	100%	35%	1	1	$0.00
B3010 Roof Coverings	$0.00	20	120%	85%	1	1	$0.00
C1010 Partitions	$0.00	30	110%	100%	1	1	$0.00


California State Community College Web Site - Windows Internet Explorer
http://fusion.deltacollege.edu/code/admin/default.htm
FUSION Forum
California St
FUSION
John Roach - FPU Admin is signed in: Access Your Info | Sign Out
Planning
Hide Tree
1.0 Capital Outla
Marin
Mendocino-Lake
Merced
MiraCosta
Monterey Peninsula
Mt. San Antonio
Mt. San Jacinto
Napa Valley
North Orange
Ohlone
Palo Verde
Palomar
Pasadena
Peralta
Rancho Santiago
Redwoods
Rio Hondo
Riverside
San Bernardino
San Diego
San Francisco
San Joaquin Delta
San Joaquin Delta College
San Jose-Evergreen
San Luis Obispo
San Mateo
Santa Barbara
Santa Clarita
Santa Monica
Sequoias
Shasta-Tehama-Trinity
PLANNING > Distri
San Joaquin
Projects
0 Project(s) W
Priority
1
2
3
4
5
6
7
8
9
10
Project - Windows Internet Explorer
http://fusion.deltacollege.edu//code/planning/project/editFPU/main.asp?id=507
Goleman Learning Resource Center Modernization
Edit Project
Campus: San Joaquin Delta College
CFIS: 40.49. 108
Project Priority: 1
Building No. : N/A
Project Title: Goleman Learning Resource Center Moderniza
Occupy Date: 2008/2009
Continued?
Project Type: Reconstruction, Infrastructure, Equipment,
Project Category: C
AB1473: FIM
COBCP Category: FIM
Project Description: The Goleman Learning Resource Center is 30 years old. When it was built, asbestos was used in the walls, flooring and ceiling. Unfortunately, the amount of asbestos, and its potential hazard to students when disturbed, has prohibited technology and electrical upgrades. Since the original electrical system cannot handle the operation of many computers the College is severely restricted in locating and operating computer systems within the LRC. The LRC does not have network access
Status: FPP-Approved
Project Phase
Distribution of Space
Forms
Score
Reports
Project Phase
Funding Date
State Funds Requested
Non State Funds
Project Cost
Land Acquisition
Preliminary Plans 2006/2007 $481,000 $482,000 $963,000
Working Drawings 2006/2007 $478,000 $477,000 $955,000
Construction Funding 2007/2008 $6,966,000 $6,966,000 $13,932,000
Equipment 2007/2008 $290,000 $289,000 $579,000
Total: $8,215,000 $8,214,000 $16,429,000
JCAF 32:

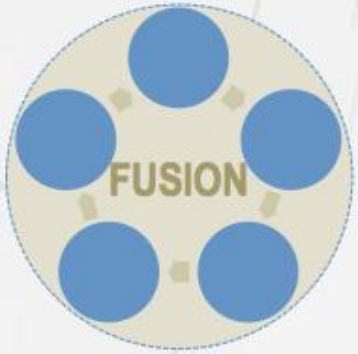
Fred Harris Presents Remotely or by Recording

Fred Harris - Assistant Vice Chancellor
California Community Colleges Chancellor's Office

http://vimeo.com/23422562

More than just software

FUSION Program



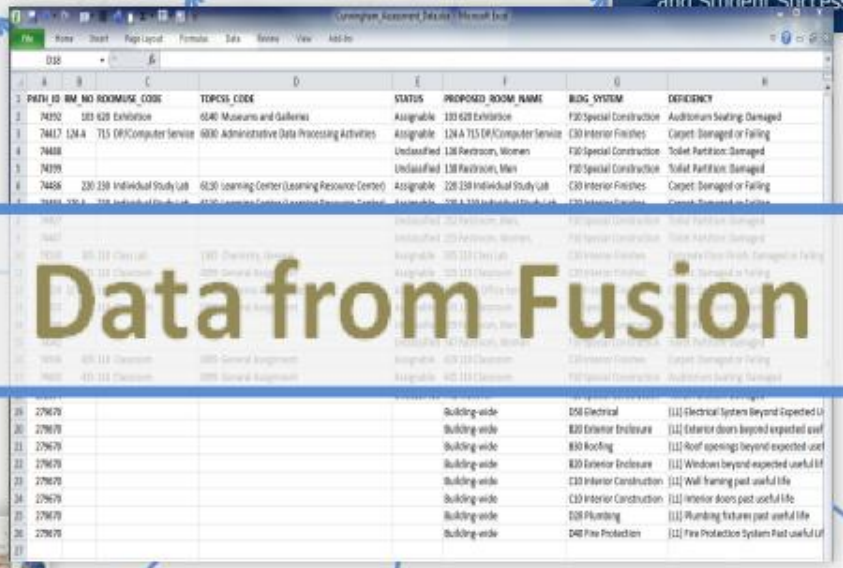
On-site Building Assessments

Web portal

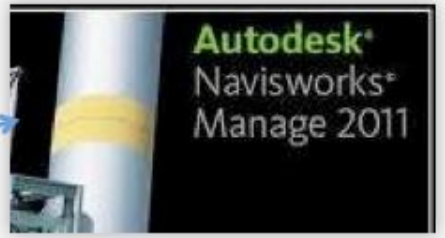
Geographic Information Systems (GIS)

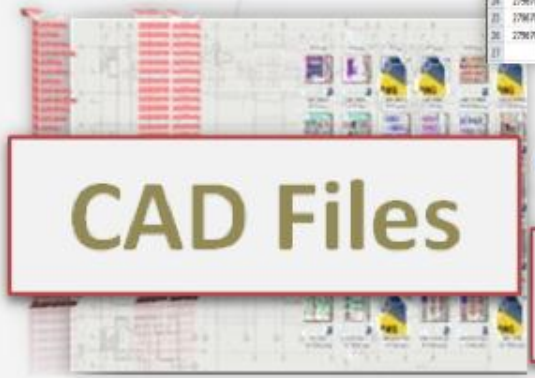
Architectural drawings database

Open Data Links to Other Applications

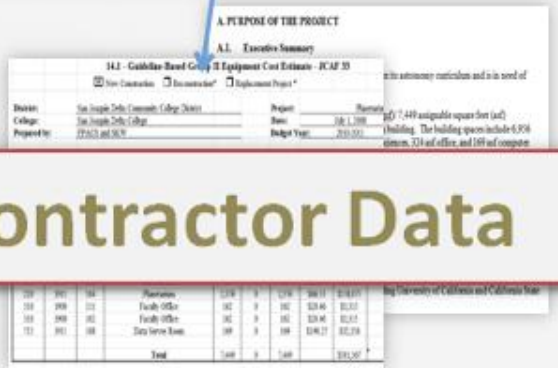


Data from Fusion

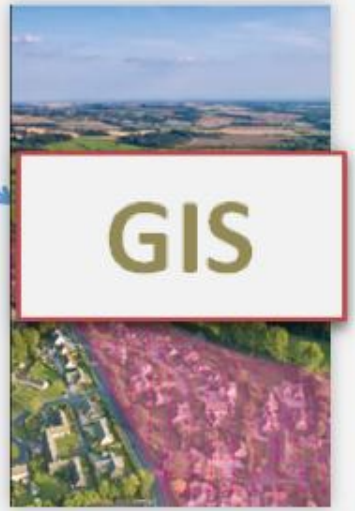




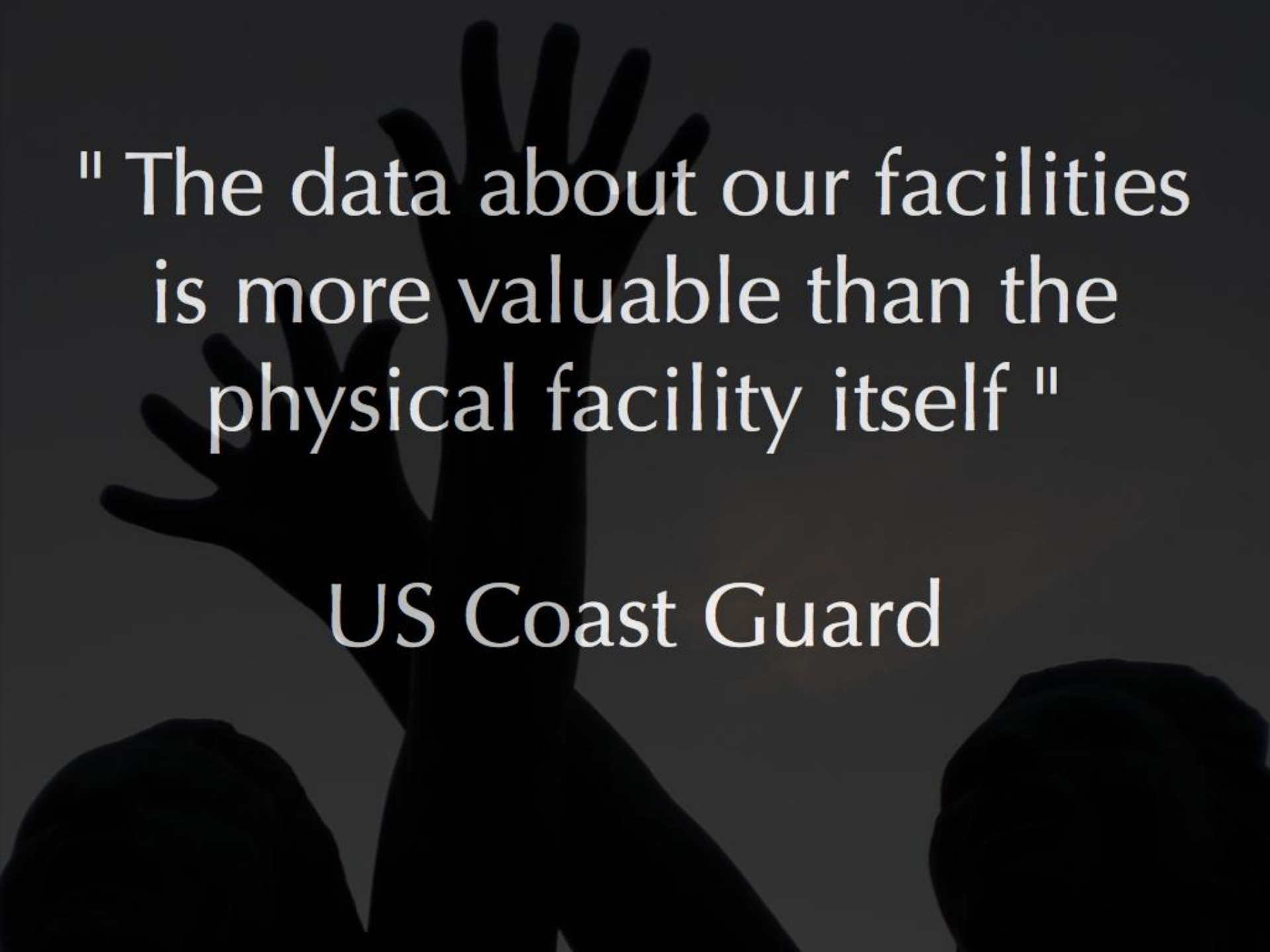
CAD Files



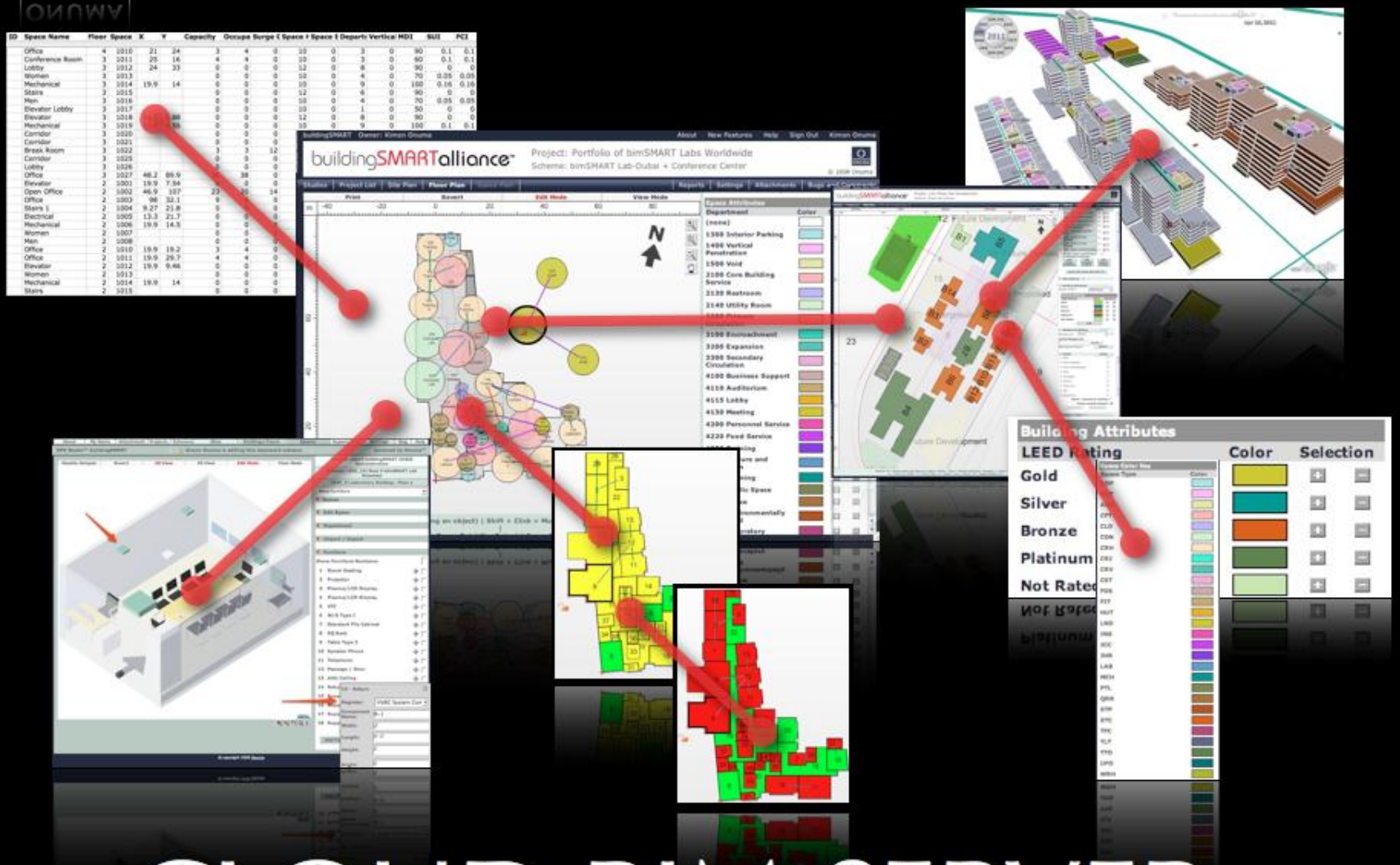
Contractor Data



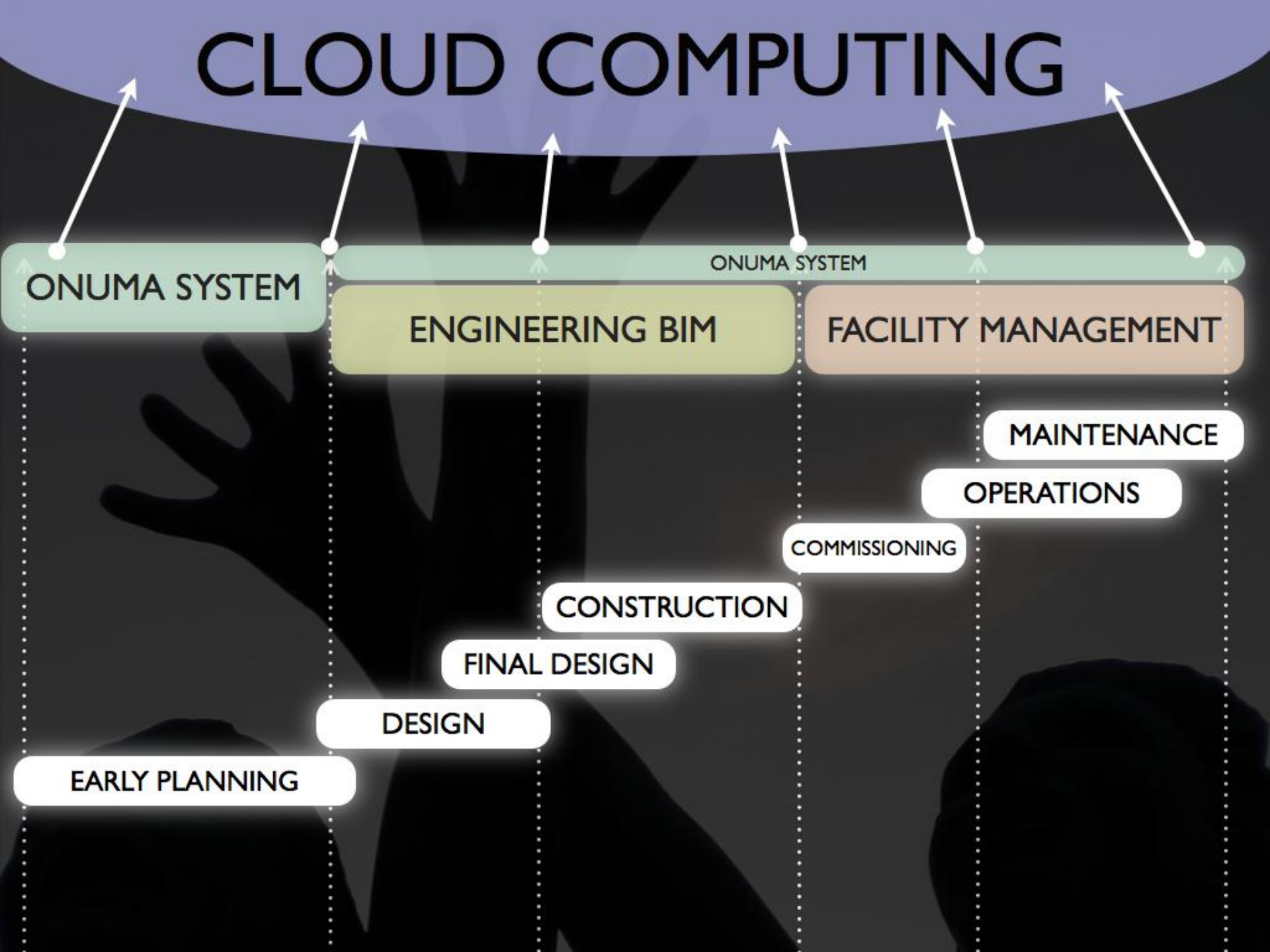
GIS


" The data about our facilities is more valuable than the physical facility itself "
US Coast Guard

ONUMA SYSTEM



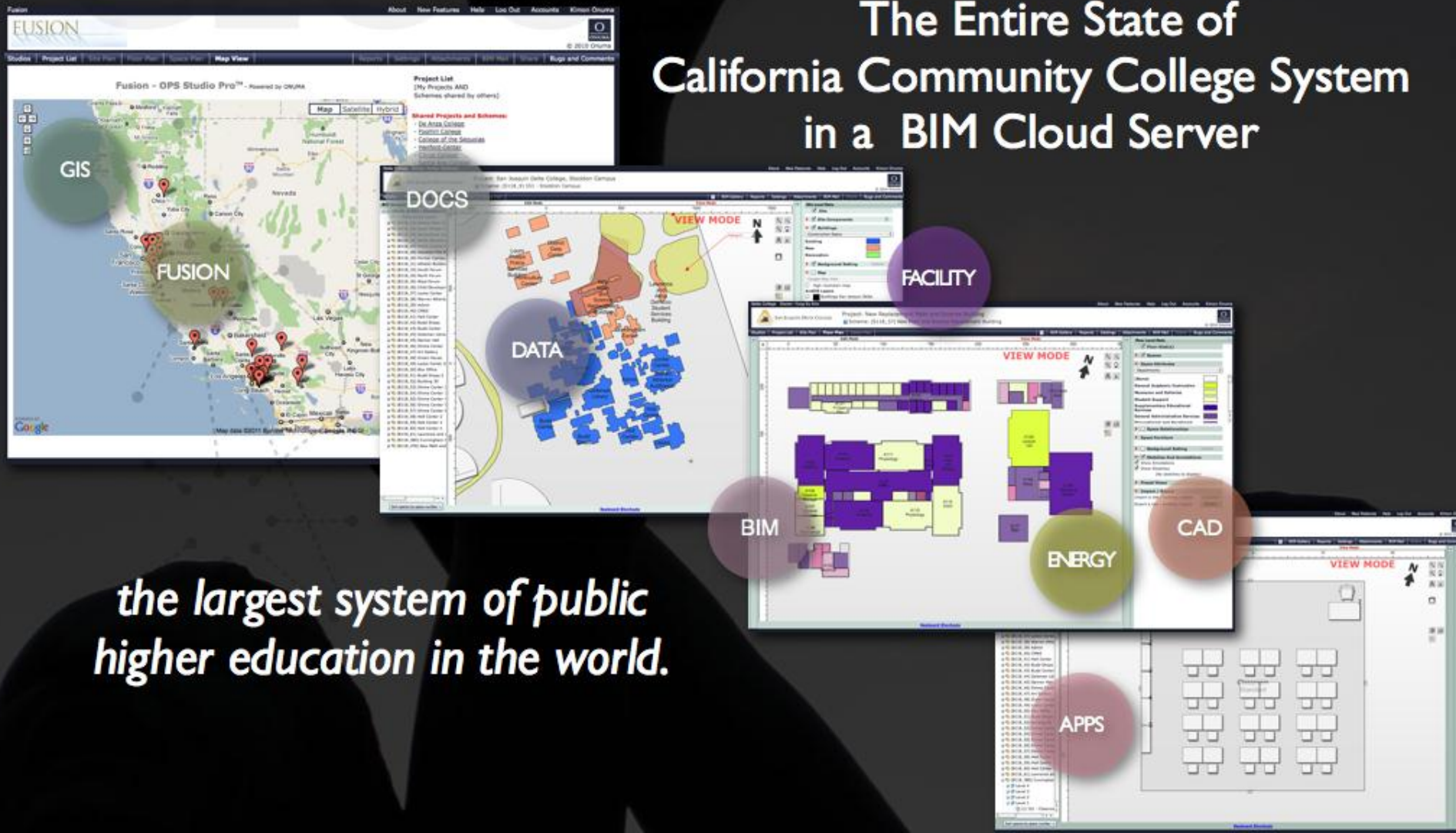
CLOUD BIM SERVER


CLOUD COMPUTING
ONUMA SYSTEM
ONUMA SYSTEM
ENGINEERING BIM
FACILITY MANAGEMENT
MAINTENANCE
OPERATIONS
COMMISSIONING
CONSTRUCTION
FINAL DESIGN
DESIGN
EARLY PLANNING

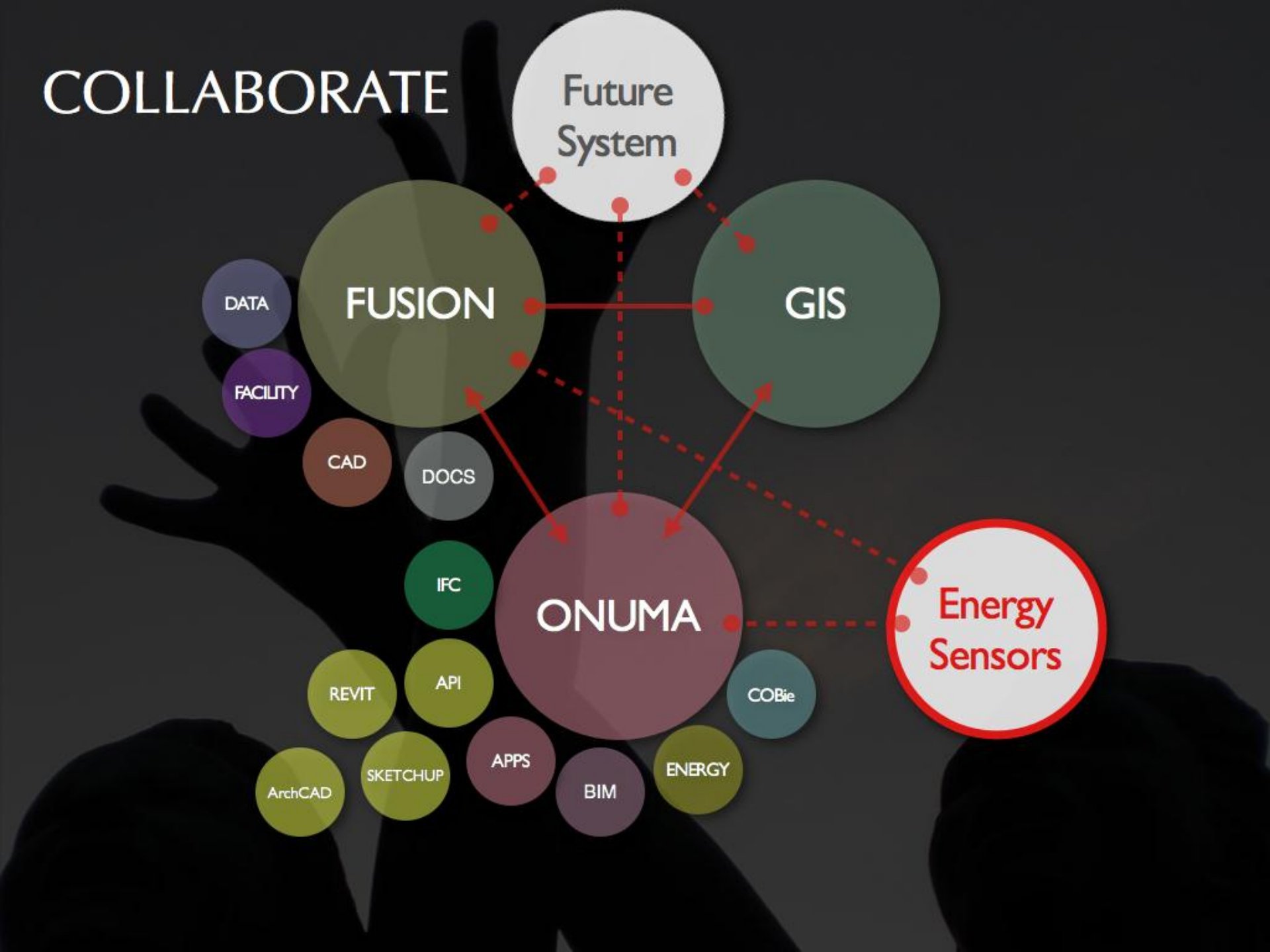
71 million SF - 5,000 Buildings

112 California locations - 2.75 million students

The Entire State of
California Community College System
in a BIM Cloud Server



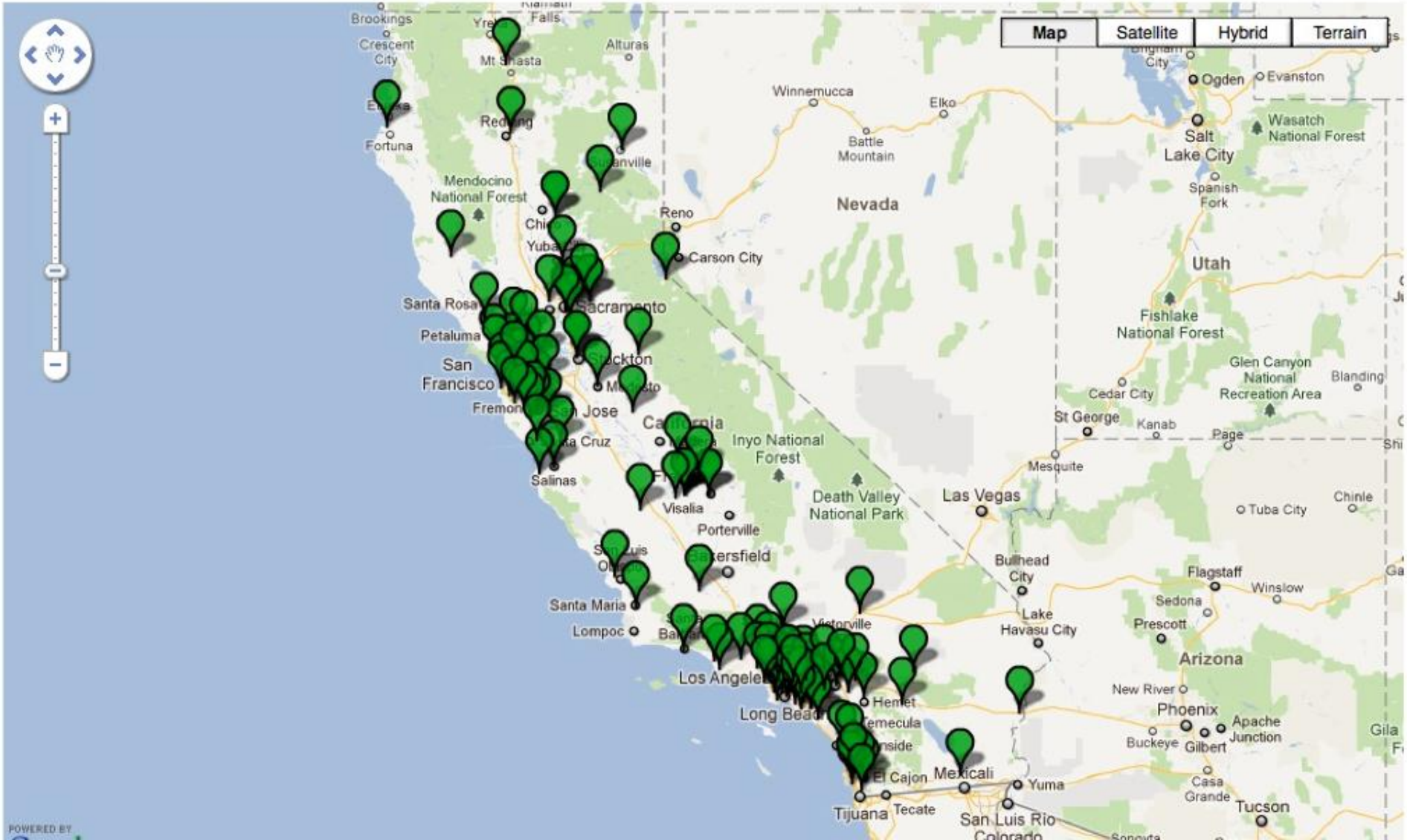
the largest system of public higher education in the world.

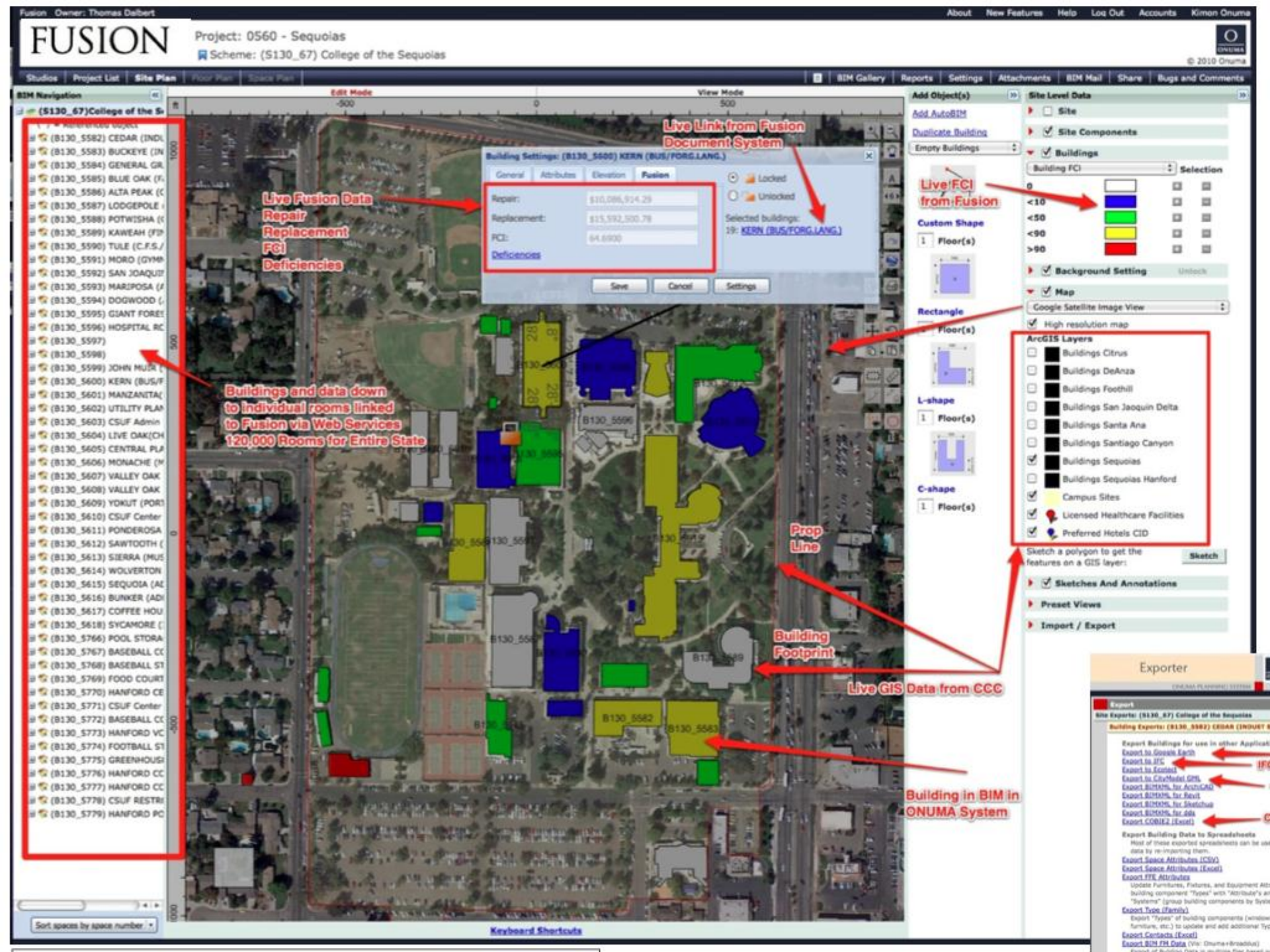

COLLABORATE
Future System
FUSION
GIS
DATA
FACILITY
CAD
DOCS
IFC
ONUMA
Energy Sensors
REVIT
API
COBie
ArchCAD
SKETCHUP
APPS
BIM
ENERGY

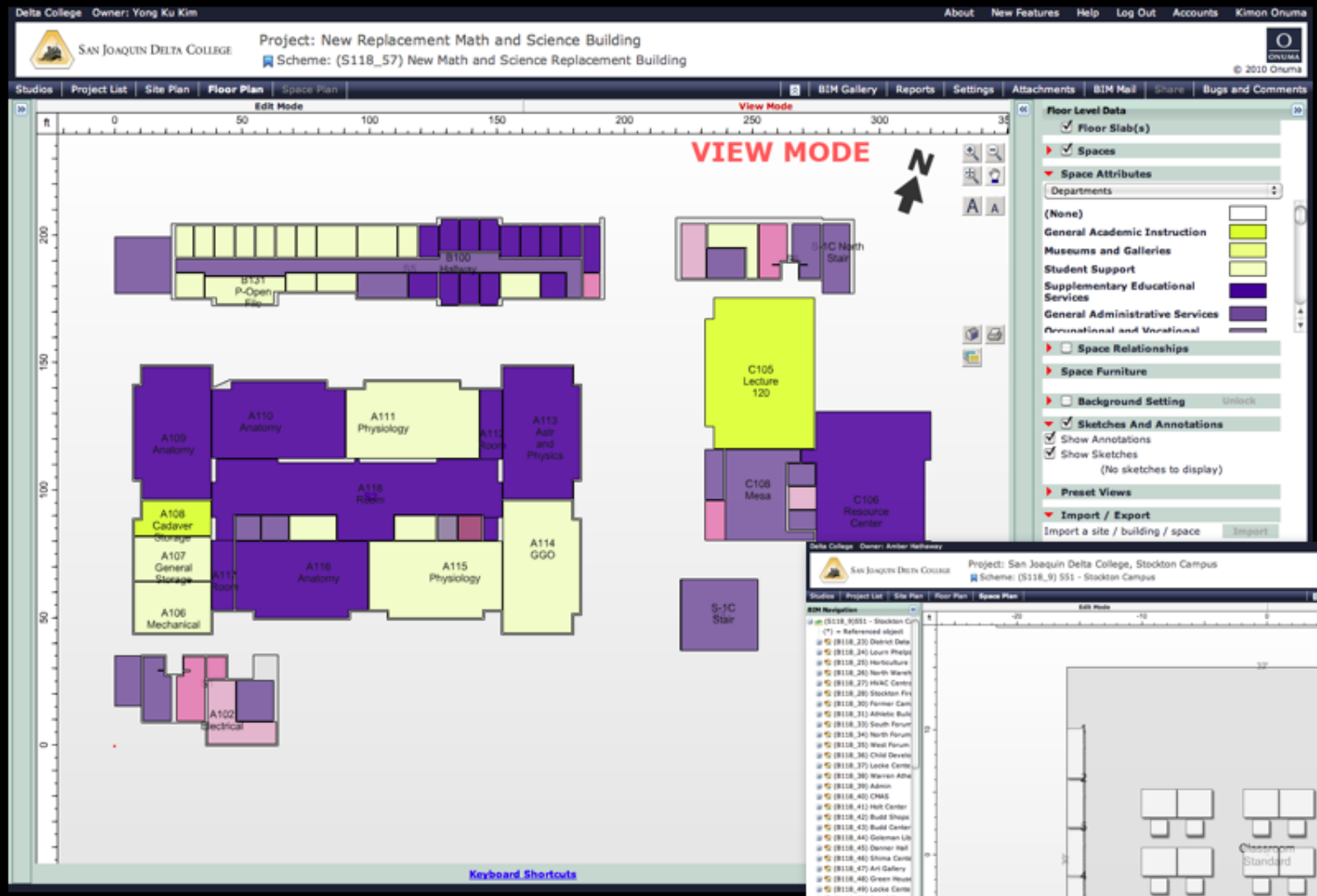
FUSION Production

72 Districts - 5,000 Buildings

Fusion Production - Studio - Powered by ONUMA



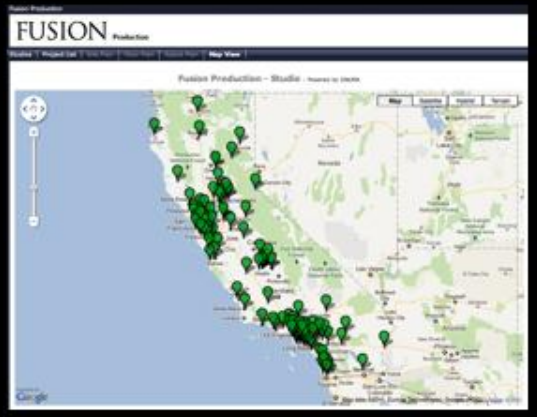

FUSION
Project: 0560 - Sequoias
Scheme: (S130_67) College of the Sequoias
Live Link from Fusion Document System
Live Fusion Data
Repair
Replacement
FCI
Deficiencies
Live FCI from Fusion
Buildings and data down to individual rooms linked to Fusion via Web Services
120,000 Rooms for Entire State
Prop Line
Building Footprint
Live GIS Data from CCC
Building in BIM in ONUMA System
Exporter


Delta College Owner: Yong Ku Kim
About New Features Help Log Out Accounts Kimon Onuma
San Joaquin Delta College
Project: New Replacement Math and Science Building
Scheme: (S118_57) New Math and Science Replacement Building
© 2010 Onuma
Studios Project List Site Plan Floor Plan Space Plan
BIM Gallery Reports Settings Attachments BIM Mail Share Bugs and Comments
Edit Mode
View Mode
VIEW MODE
N
B100 Hallway
B131 P-Open Fac
S-1C North Stair
C105 Lecture 120
C108 Mesa
C106 Resource Center
A109 Anatomy
A110 Anatomy
A111 Physiology
A113 Astr and Physics
A118 Ridem
A108 Cadaver Storage
A107 General Storage
A106 Mechanical
A116 Anatomy
A115 Physiology
A114 GGO
S-1C Stair
A102 Electrical
Floor Level Data
Floor Slab(s)
Spaces
Space Attributes
Departments
(None)
General Academic Instruction
Museums and Galleries
Student Support
Supplementary Educational Services
General Administrative Services
Space Relationships
Space Furniture
Background Setting
Sketches And Annotations
Show Annotations
Show Sketches
(No sketches to display)
Preset Views
Import / Export
Import a site / building / space
Import
Keyboard Shortcuts
Project: San Joaquin Delta College, Stockton Campus
Scheme: (S118_9) S51 - Stockton Campus
VIEW MODE
Classroom Standard

1

SAN JOAQUIN -DELTA

72



72 DISTRICTS

2-7

LONG BEACH

LOS RIOS-FOLSOM

CITRUS

RANCHO SANTIAGO

FOOTHILL -DANZA

SEQUOIAS HANFORD

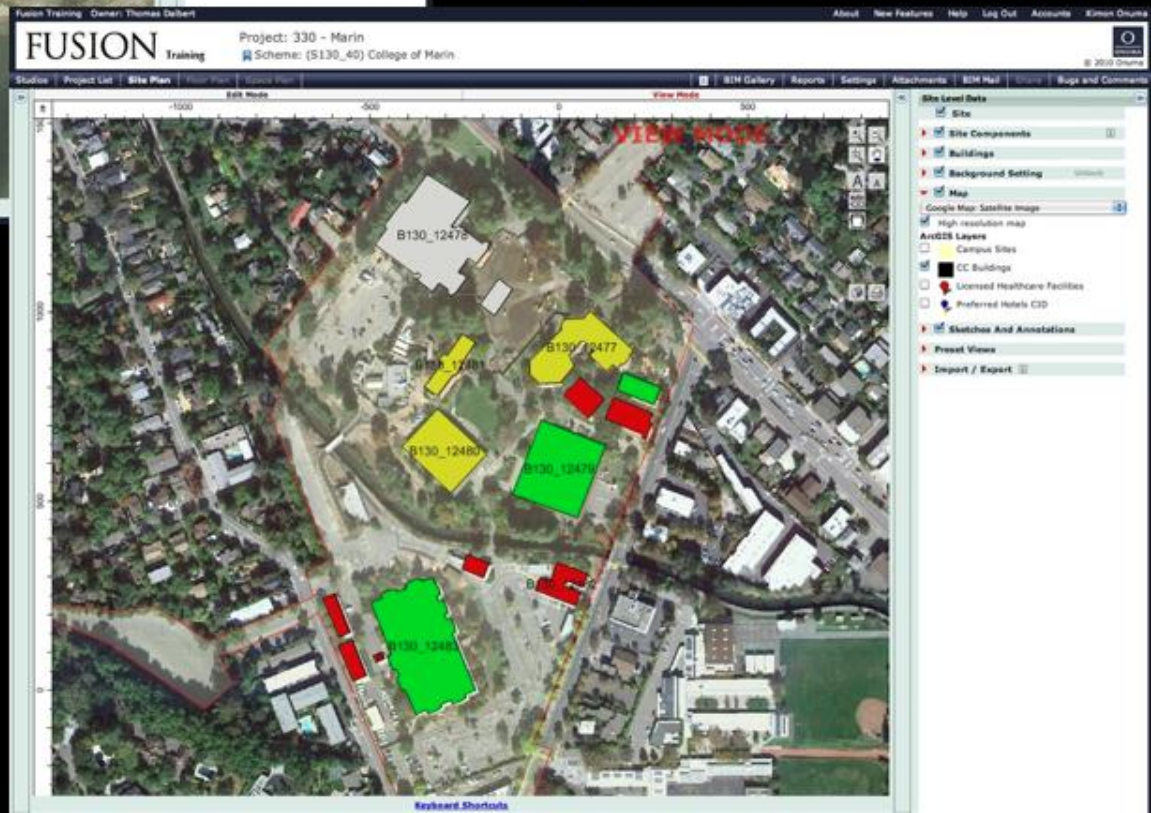
LANEY COLLEGE

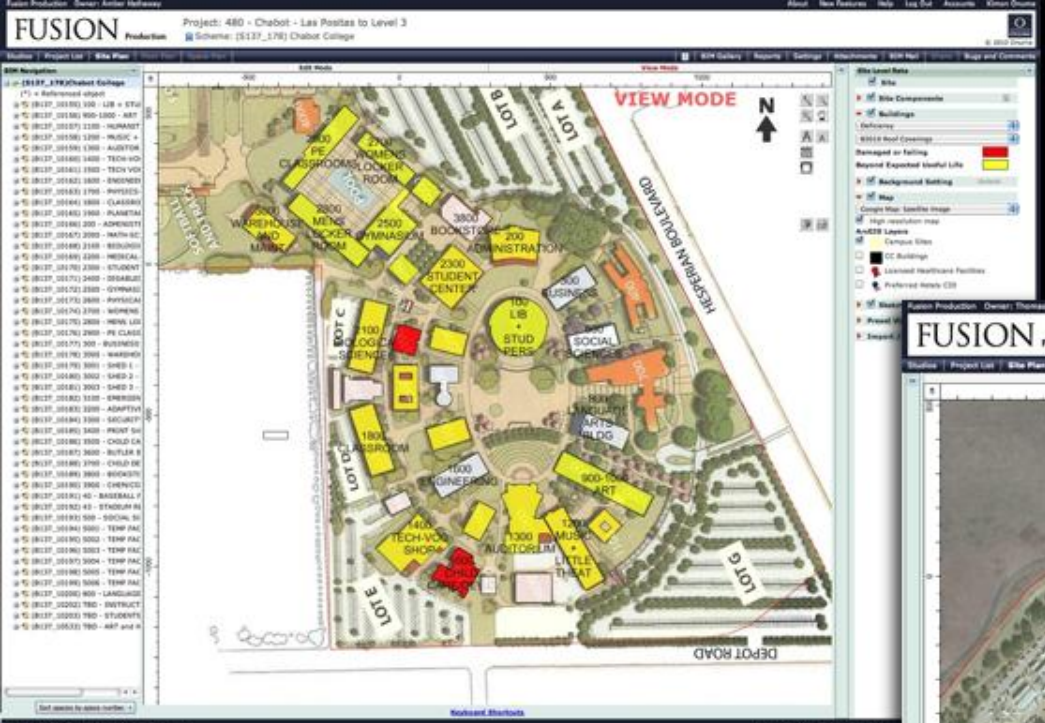
ARCHITECTURE / vbn

8

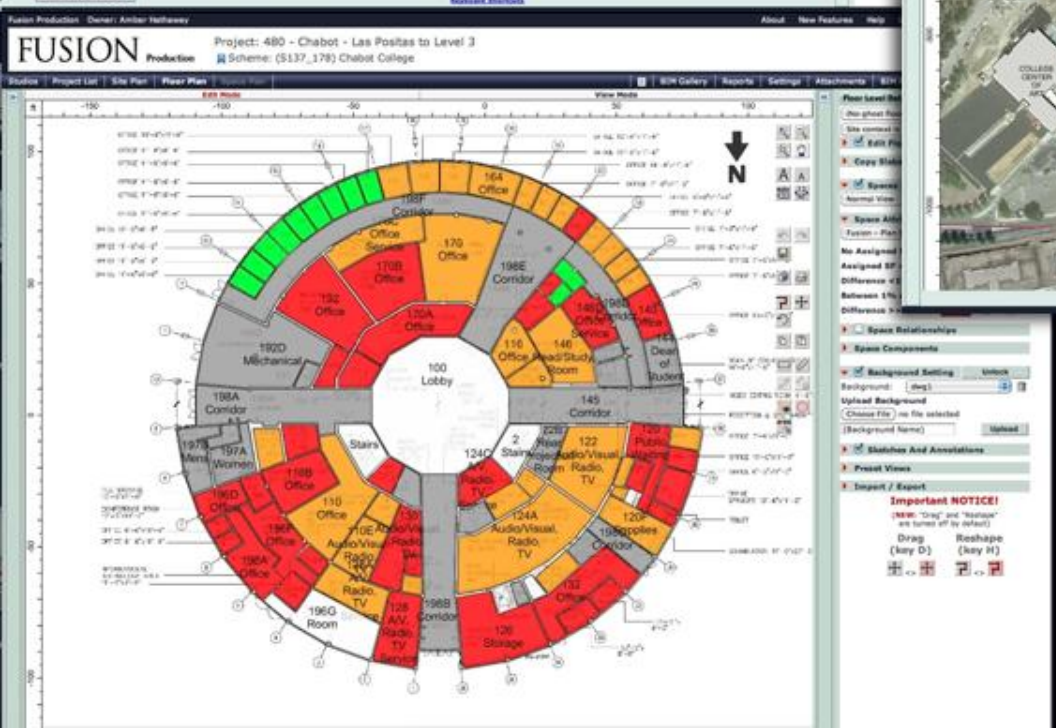
9

COLLEGE OF MARIN

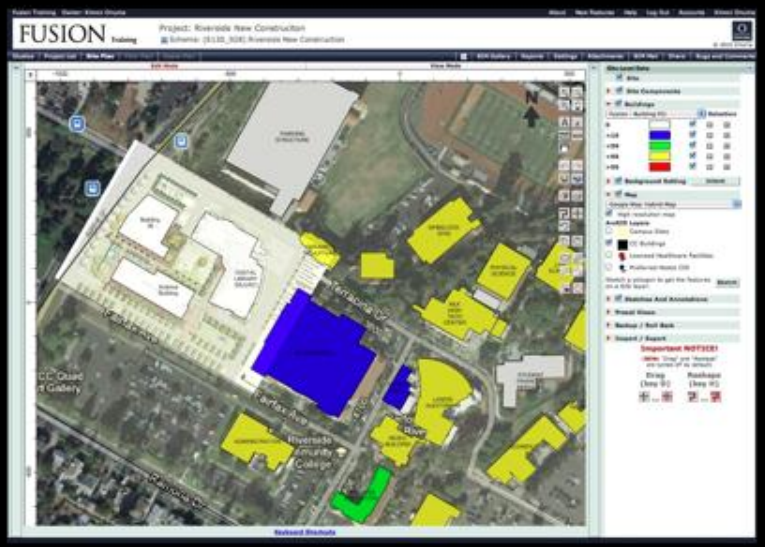




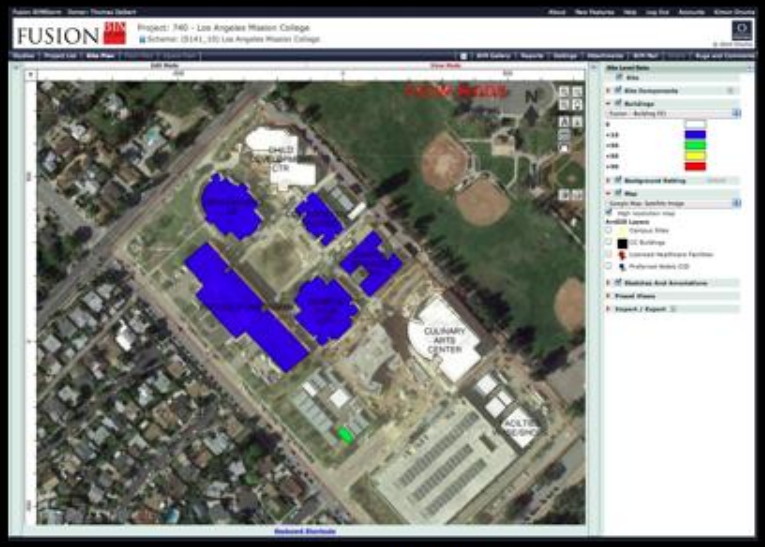
10 CHABOT COLLEGE



11 LAS POSITAS



RIVERSIDE



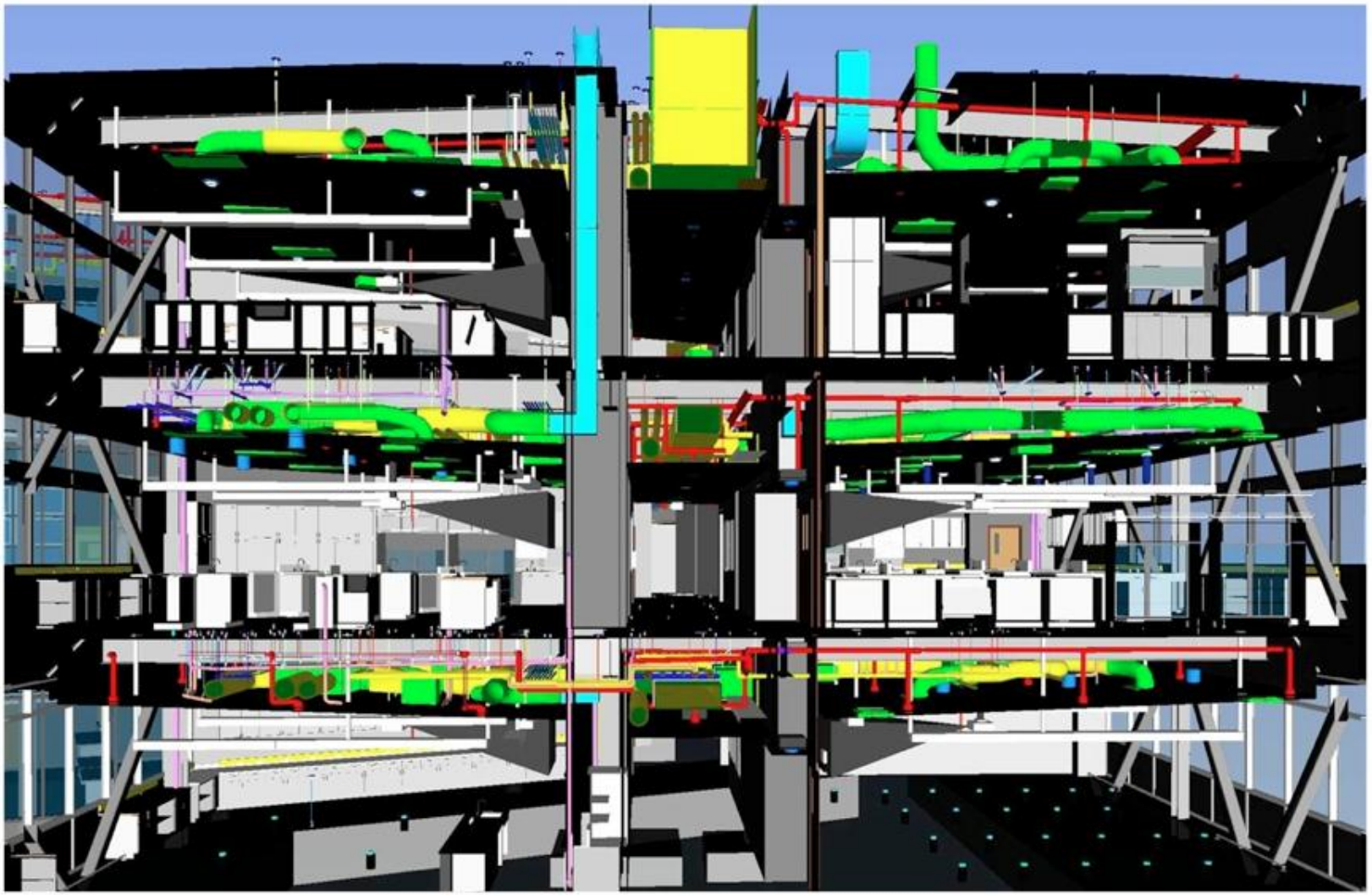
LACCD - MISSION

12 SCIENCE BLDG

Balfour Beatty Construction

13 EDUCATION LAB

Pankow



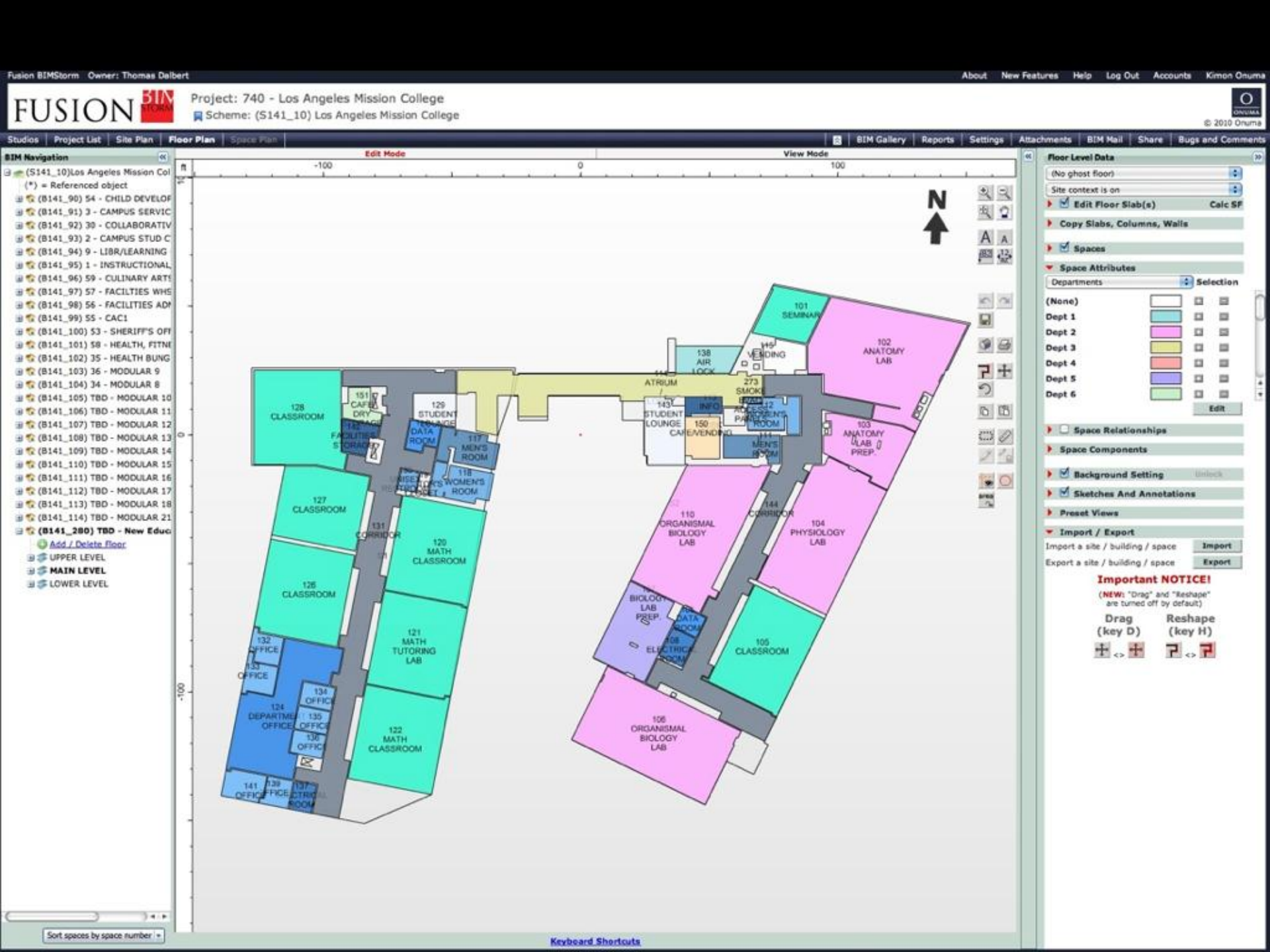
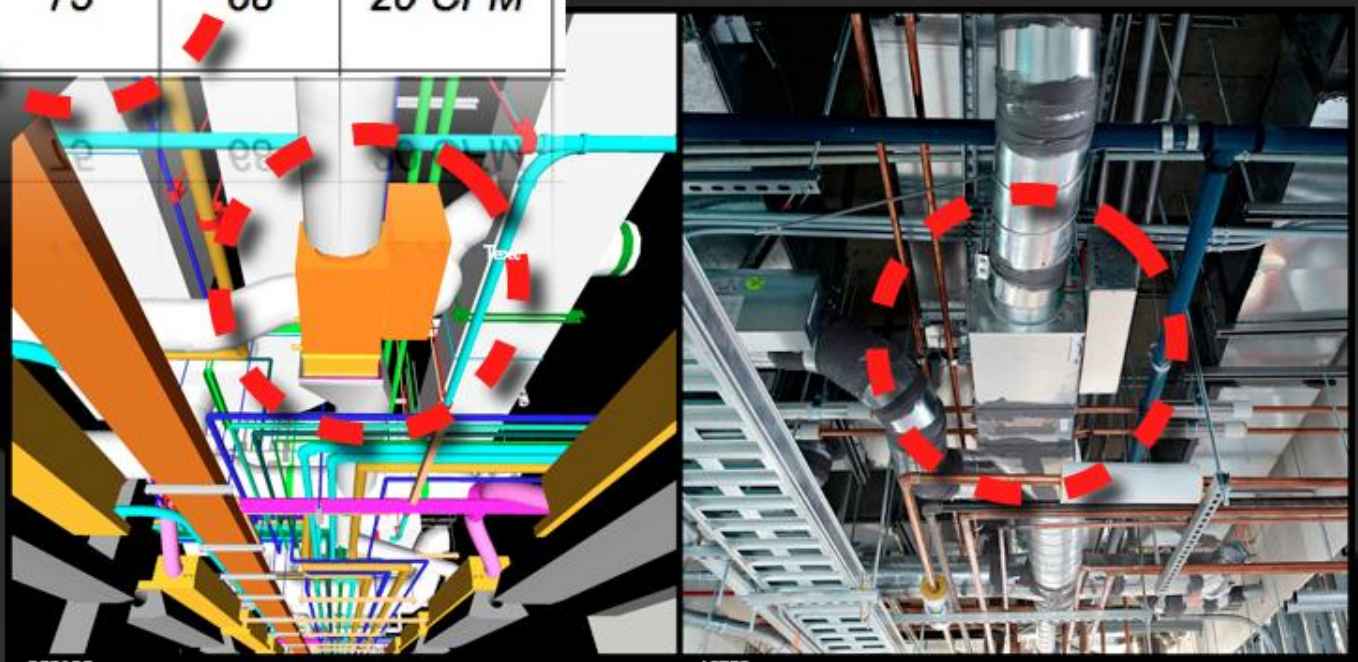

Fusion BIMStorm Owner: Thomas Dalbert
About New Features Help Log Out Accounts Kimon Onuma
FUSION BIM STORM
Project: 740 - Los Angeles Mission College
Scheme: (S141_10) Los Angeles Mission College
© 2010 Onuma
Studios Project List Site Plan Floor Plan Space Plan
BIM Gallery Reports Settings Attachments BIM Mail Share Bugs and Comments
BIM Navigation
(S141_10)Los Angeles Mission Col
(*) = Referenced object
(B141_90) 54 - CHILD DEVELOF
(B141_91) 3 - CAMPUS SERVIC
(B141_92) 30 - COLLABORATIV
(B141_93) 2 - CAMPUS STUD C
(B141_94) 9 - LIBR/LEARNING
(B141_95) 1 - INSTRUCTIONAL
(B141_96) 59 - CULINARY ARTS
(B141_97) 57 - FACILITIES WHS
(B141_98) 56 - FACILITIES ADM
(B141_99) 55 - CAC1
(B141_100) 53 - SHERIFF'S OFI
(B141_101) 58 - HEALTH, FITNE
(B141_102) 35 - HEALTH BUNG
(B141_103) 36 - MODULAR 9
(B141_104) 34 - MODULAR 8
(B141_105) TBD - MODULAR 10
(B141_106) TBD - MODULAR 11
(B141_107) TBD - MODULAR 12
(B141_108) TBD - MODULAR 13
(B141_109) TBD - MODULAR 14
(B141_110) TBD - MODULAR 15
(B141_111) TBD - MODULAR 16
(B141_112) TBD - MODULAR 17
(B141_113) TBD - MODULAR 18
(B141_114) TBD - MODULAR 21
(B141_280) TBD - New Educ
Add / Delete Floor
UPPER LEVEL
MAIN LEVEL
LOWER LEVEL
Sort spaces by space number
Edit Mode
View Mode
-100
0
100
N
128 CLASSROOM
127 CLASSROOM
126 CLASSROOM
151 CAFE DRY
152 FACILITIES STORAGE
129 STUDENT LOUNGE
DATA ROOM
117 MEN'S ROOM
118 WOMEN'S ROOM
131 CORRIDOR
120 MATH CLASSROOM
121 MATH TUTORING LAB
122 MATH CLASSROOM
132 OFFICE
133 OFFICE
134 OFFICE
135 OFFICE
136 OFFICE
124 DEPARTMENT OFFICE
141 OFFICE
139 OFFICE
137 ELECTRICAL ROOM
138 AIR LOCK
145 VENDING
ATRIUM
273 SMOKE
143 STUDENT LOUNGE
INFO
150 CAFE/VENDING
112 WOMEN'S RESTROOM
111 MEN'S ROOM
101 SEMINAR
102 ANATOMY LAB
103 ANATOMY LAB PREP.
144 CORRIDOR
110 ORGANISMAL BIOLOGY LAB
104 PHYSIOLOGY LAB
BIOLOGY LAB PREP.
DATA ROOM
108 ELECTRICAL ROOM
105 CLASSROOM
106 ORGANISMAL BIOLOGY LAB
Keyboard Shortcuts
Floor Level Data
(No ghost floor)
Site context is on
Edit Floor Slab(s) Calc SF
Copy Slabs, Columns, Walls
Spaces
Space Attributes
Departments
Selection
(None)
Dept 1
Dept 2
Dept 3
Dept 4
Dept 5
Dept 6
Edit
Space Relationships
Space Components
Background Setting Unlock
Sketches And Annotations
Preset Views
Import / Export
Import a site / building / space Import
Export a site / building / space Export
Important NOTICE!
(NEW: "Drag" and "Reshape" are turned off by default)
Drag (key D)
Reshape (key H)

Table 11: Room Design Data

Room Name	Space Temperature Setpoints [°F]		Outdoor Air Flow Rate [cfm]
	Coolin	Heatin	
Typical Exam Room - ED	*72*	*68*	*2 ACH*
Typical Exam Room - MOB	*75*	*68*	*20 CFM*

Table 11: Room Design Data

Room Name	Space Temperature Setpoints [°F]		Outdoor Air Flow Rate [cfm]
	Coolin	Heatin	
Typical Exam Room - ED	*72*	*68*	*2 ACH*
Typical Exam Room - MOB	*75*	*68*	*20 CFM*



Balfour Beatty Construction

LACCD: COBie Data Specification

(Prepared By: Onuma / Broaddus & Associates)

LACCD:

COBie Data Specification

ONUMA, Inc.
1055 East Colorado Blvd.
Suite 500
Pasadena, CA 91106
626 793 7400
http://ONUMA.com

BIM & FM

BIM FM - Component Workbook

V 10.40

The BIM & FM Excel Templates are set up to guide design and construction teams in the formatting of Facility Management Data and ease the import of FM Data into systems such as the ONUMA System.
The intent of these Workbooks is to format data into a COBIE2 compliant format.

Data for these Workbooks can originate from multiple sources:

1. From CAD Models / BIM(s) (exported as schedules)
2. From other data sources (lists / spreadsheets)
3. From other databases such as MS Access
4. Manually entered into these Workbooks

This Excel file is set up for easy entry of data into Workbook "Components".
Please use the other Workbooks listed below to complete data entry for other categ
Yellow fields are required fields – green are optional.
The "Component Name" of the Components needs to be unique since it is used as
"Space Number" and "Type Name" uniquely link the records to a Space and a Type
Components can be linked to one or more Systems which can be listed in the third

BIM FM Workbooks:

Other Workbooks that should be used along with this one include:

Contact
Facility
Space
Type
Component
Attribute
Document
Spare
Resource
Job

For questions or comments please contact: dalbert@onuma.com
For more information see https://www.onuma.com/products/BimFmData.php

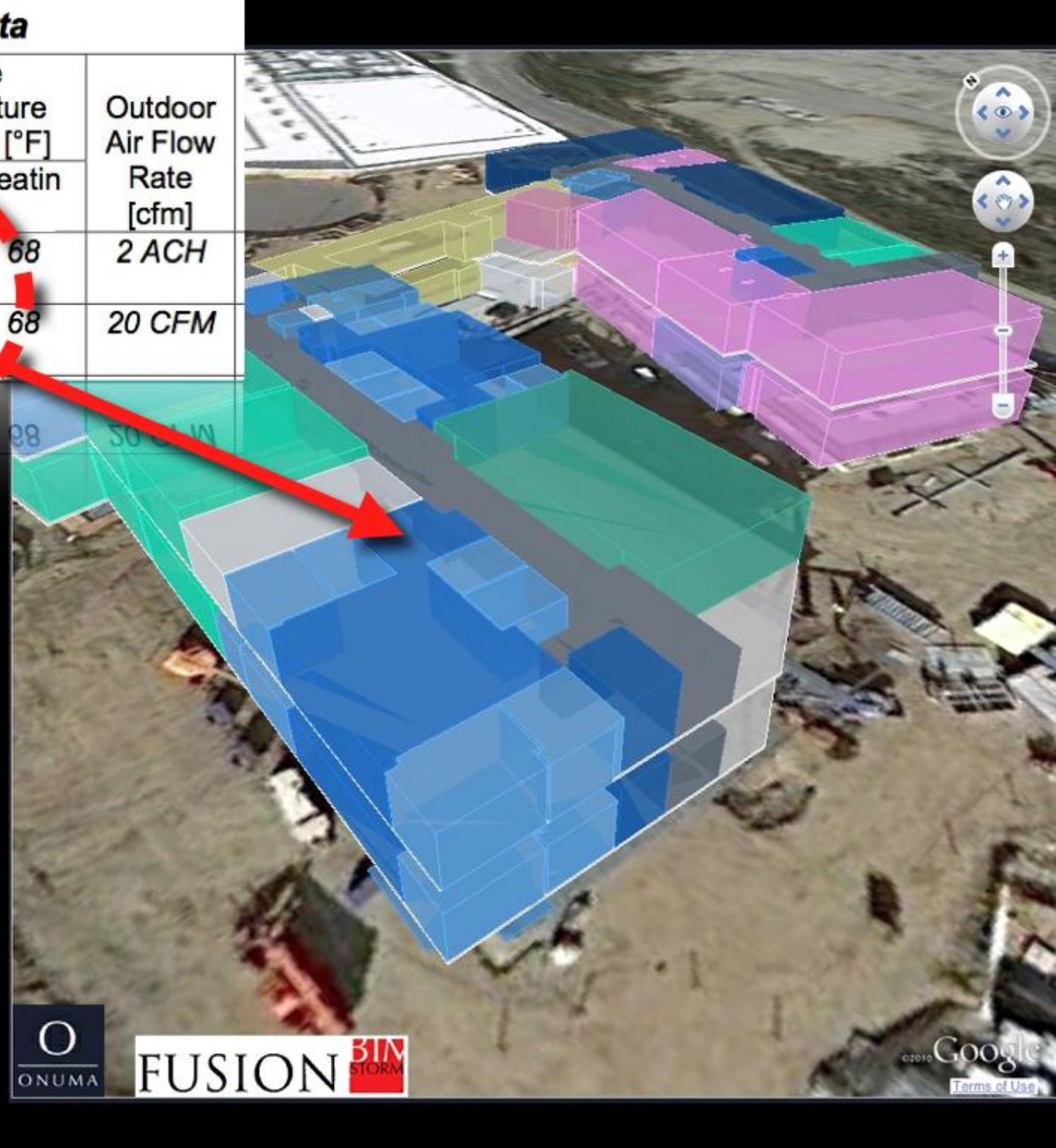
COBie Exhibit 1: Data Authoring Matrix

ONUMA

BROADDUS & ASSOCIATES

Table 11: Room Design Data

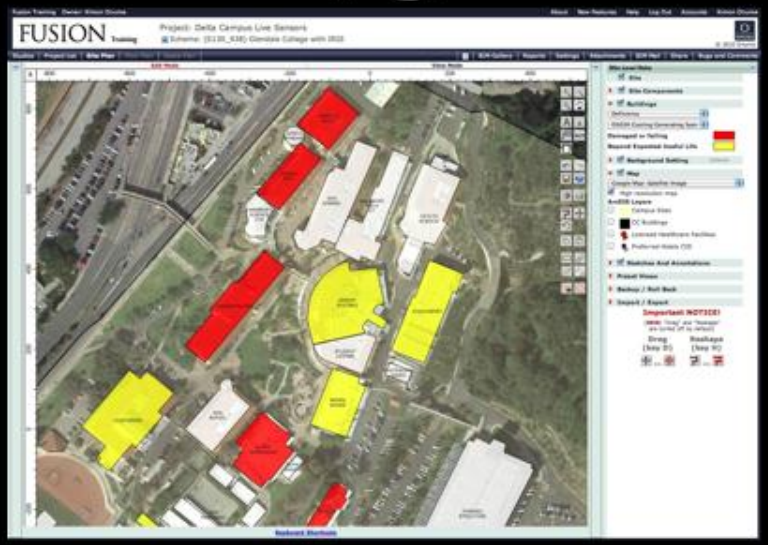
Room Name	Space Temperature Setpoints [°F]		Outdoor Air Flow Rate [cfm]
	Cooling	Heating	
Typical Exam Room - ED	*72*	*68*	*2 ACH*
Typical Exam Room - MOB	*75*	*68*	*20 CFM*



14

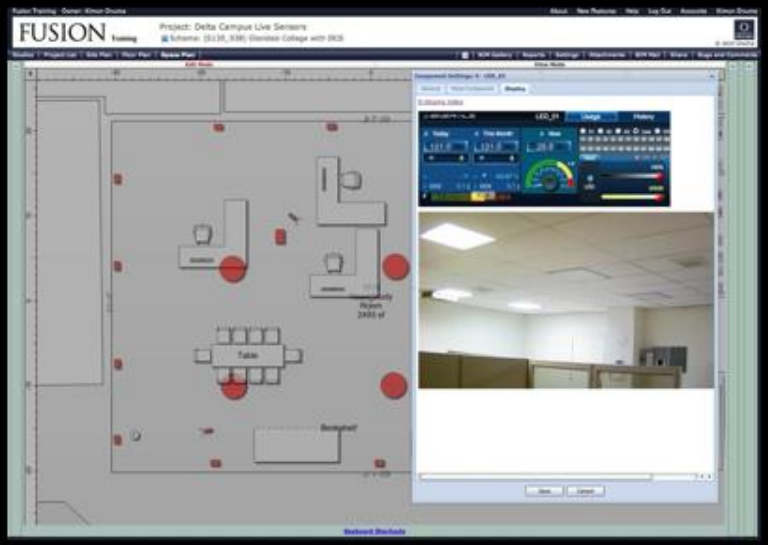
MIRA COSTA

15



GLENDALE COLLEGE

LIVE SENSORS



DISTRICTS 1-15

SAN JOAQUIN -DELTA

LONG BEACH

CITRUS

LOS RIOS-FOLSOM

RANCHO SANTIAGO

FOOTHILL -DANZA

SEQUOIAS HANFORD

MIRA COSTA

GLENDALE COLLEGE

LIVE SENSORS

RIVERSIDE

SCIENCE BLDG

10 More

LACCD - MISSION

EDUCATION LAB

CHABOT COLLEGE

LAS POSITAS

LAS POSITAS


1. Log In
2. Studios
3. Projects
4. Site
5. Building
6. Room
on iPAD and iPhone

Studios Sites Building Floor

Prototypical CCC Buildings
Delta College with New Clinic and Sensors Demonstration (S130_152)
Clinic (B130_8283)

First Floor

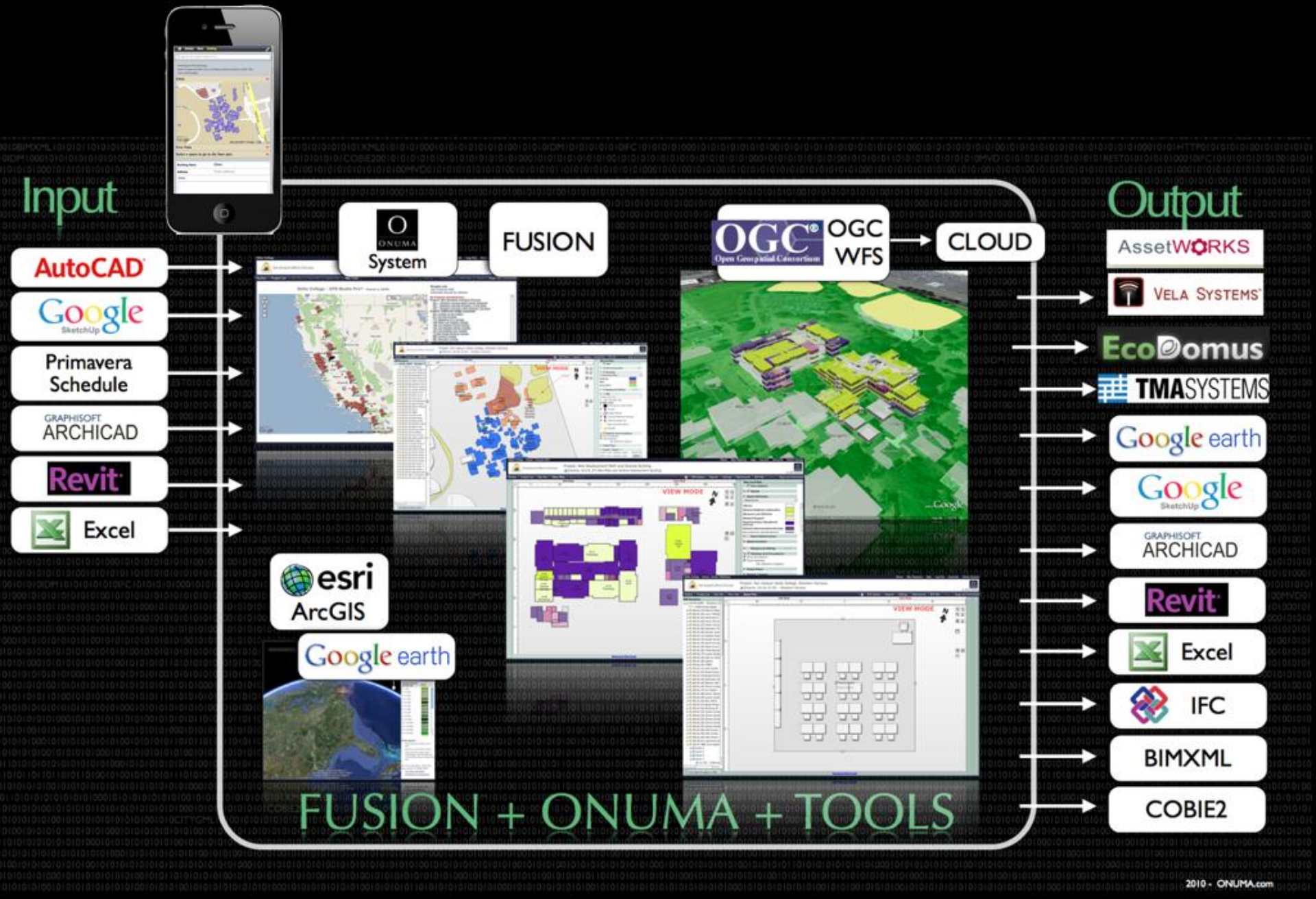
1B05 - PAT./STAFF TLT.

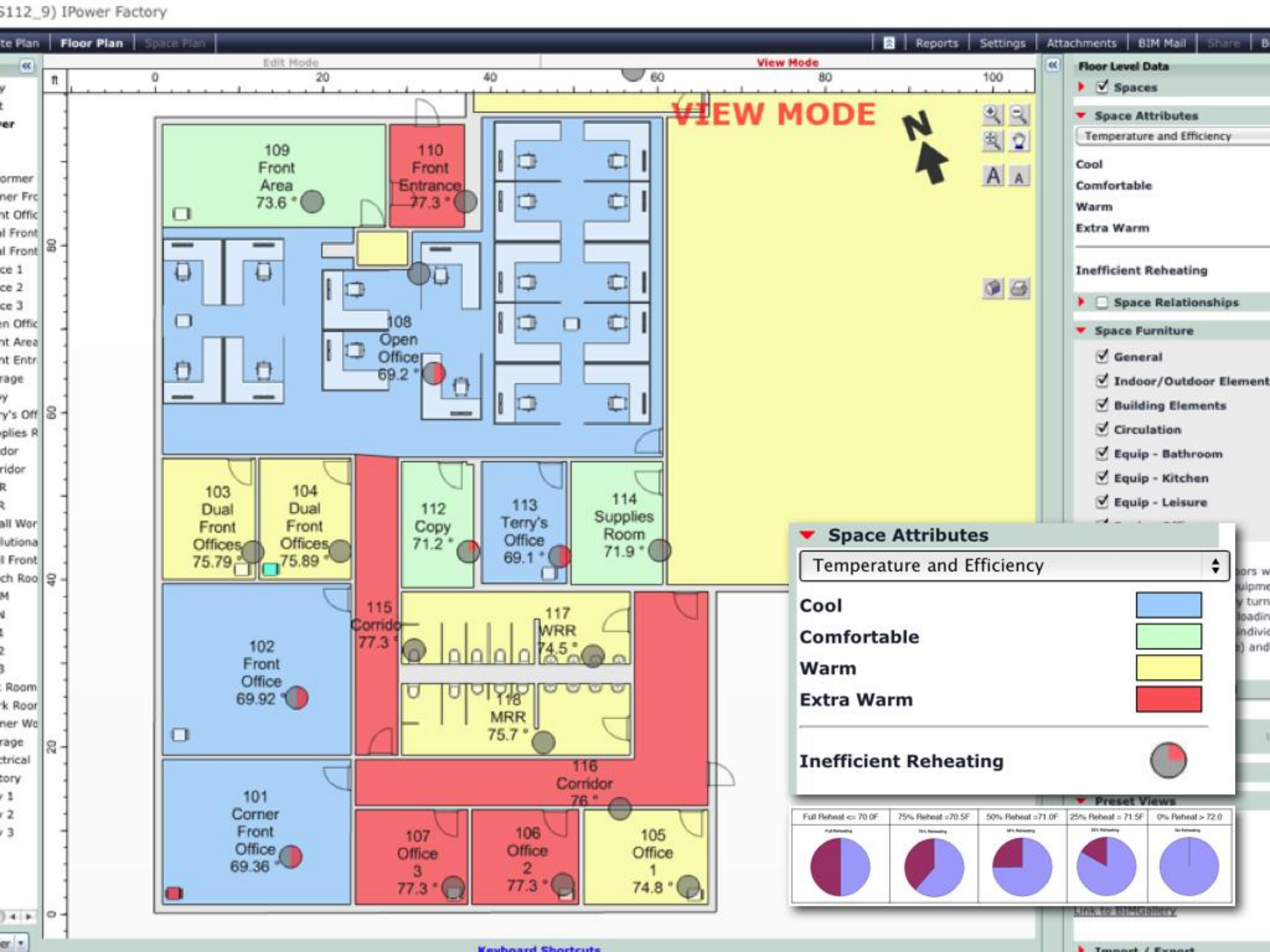
Go into Space

Illumination Foot Candles

- 10
- 15
- 20
- 30
- 40
- 50
- 60
- 70
- 80
- 90
- 100
- 150

Space Name	PAT./STAFF TLT.
Space Number	1B05
Space Area	46.05 sf
Curr. Occupancy	0
Height (feet)	13.12
RADIOLOGY	
HVAC: conditioned	
vRoc Graph 1	<iframe src="http://lavelleenergy.com/energy/vroc_web
vRoc Graph 2	<iframe src="http://lavelleenergy.com/energy/vroc_web/
vRoc Graph 3	<iframe src="http://lavelleenergy.com/energy/vroc_web/
Video	
Perimeter	27.4278215223097
Area	46.0490851537261
Volume	0
Limit Offset	13.1233595800525
Name	PAT./STAFF TLT.
Unbounded Height	13.1233595800525
Phase	New Construction
Number	1B05
vRoc Type	Temperature
VRoc Sensor	T_123.devices.connectivity_week_site
Target Temperatur	72
Omni Class Spaces: (No Value Assigned)	
Sound Transmission: 40	
Floor Load lbs/sf: 60	
Illumination Foot Candles: 20	
Medical Vacuum: (No Value Assigned)	
Dental Compressed Air: (No Value Assigned)	
Dental Low Vacuum: (No Value Assigned)	
Air Balance: EX	
Air Changes: 10	
Minimum Outside Air changes per hour: (No Value Assigned)	
Minimum Interior Temperature for Summer: (No Value Assigned)	
Maximum Interior Temperature for winter: 68	
Intermediate Filtration %: (No Value Assigned)	
Exhaust Outside: Yes	
Floor Finish - Primary: CT	
Wall Material - Primary: G	


Input
AutoCAD
Google SketchUp
Primavera Schedule
GRAPHISOFT ARCHICAD
Revit
Excel
ONUMA System
FUSION
OGC WFS
CLOUD
esri ArcGIS
Google earth
Output
AssetWORKS
VELA SYSTEMS
EcoDomus
TMASYSTEMS
Google earth
Google SketchUp
GRAPHISOFT ARCHICAD
Revit
Excel
IFC
BIMXML
COBIE2
FUSION + ONUMA + TOOLS
2010 - ONUMA.com


S112_9) IPower Factory
Floor Plan
Reports
Settings
Attachments
BIM Mail
Edit Mode
View Mode
VIEW MODE
109 Front Area 73.6 °
110 Front Entrance 77.3 °
108 Open Office 69.2 °
103 Dual Front Offices 75.79 °
104 Dual Front Offices 75.89 °
112 Copy 71.2 °
113 Terry's Office 69.1 °
114 Supplies Room 71.9 °
115 Corridor 77.3 °
117 WRR 74.5 °
118 MRR 75.7 °
102 Front Office 69.92 °
116 Corridor 76 °
101 Corner Front Office 69.36 °
107 Office 3 77.3 °
106 Office 2 77.3 °
105 Office 1 74.8 °
Floor Level Data
Spaces
Space Attributes
Temperature and Efficiency
Cool
Comfortable
Warm
Extra Warm
Inefficient Reheating
Space Relationships
Space Furniture
General
Indoor/Outdoor Element
Building Elements
Circulation
Equip - Bathroom
Equip - Kitchen
Equip - Leisure
Space Attributes
Temperature and Efficiency
Cool
Comfortable
Warm
Extra Warm
Inefficient Reheating
Preset Views
Full Reheat <= 70.0F
75% Reheat =70.5F
50% Reheat =71.0F
25% Reheat = 71.5F
0% Reheat > 72.0
Link to BIMGallery
Keyboard Shortcuts

Edit Mode | View Mode

0 20 40 60 80 100

VIEW MODE

119 Small Work Room

Lenfant Plaza - Building 9

Temperature

Energy Demand

powered by pachube pachube.com

Office 74.81 °
Office 3 71.7 °
Office 2 71.6 °
Office 1 73.4 °

Add Object(s)

READ/WRITE access is required to add additional spaces.

Basic Shapes

300 SF Rectangular

L-Shape 1

Floor Level Data

Spaces

Space Attributes

Temperature and Efficiency

Cool

Comfortable

Warm

Extra Warm

Space Relationships

Space Furniture

General

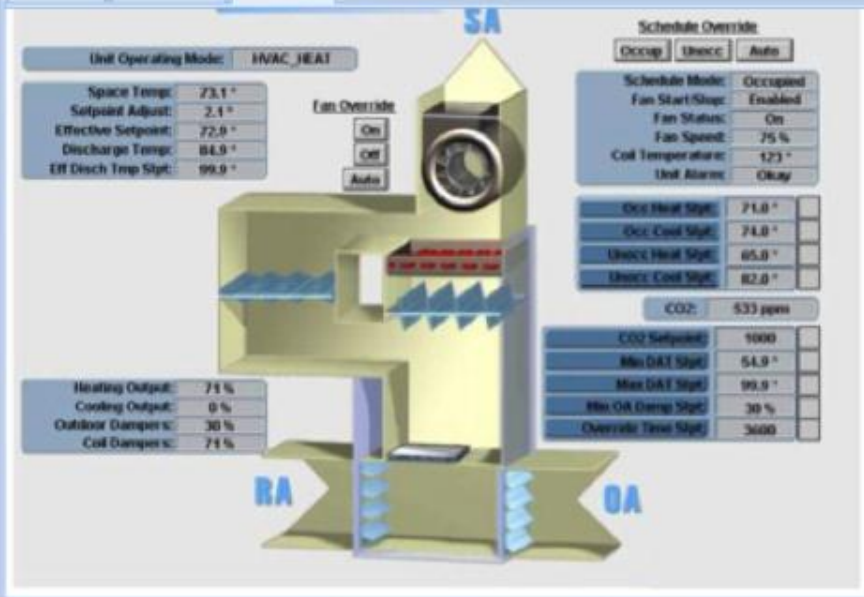
Indoor/Outdoor Ele

Building Elements

Circulation

Space Settings: 30 - Open Office

General | Attributes | Display



Close | Settings

3 Administration RT Temp

Link to BIMGallery


FUSION Training
Project: 730 - Glendale
Scheme: (S130_85) Glendale College
Studios | Project List | Site Plan | Floor Plan | Space Plan
BIM Gallery | Reports | Settings | Attachments | BIM Mail | Share | Bugs and Comments
BIM Navigation
(S130_85)Glendale College
(*) = Referenced object
Edit Mode
View Mode
Floor Level Data
Spaces
Space Attributes
power submeter in electrical room
CHW and HHW sensors on pipe in ceiling
room ambient air temp sensor
ENERGLE
LED_01
Usage
History
Today
473.5 Wh
This Month
21.7 kWh
Now
43.0 W
S1 S2 S3 S4 User
CO2 0.2 g
CO2 9.2 g
LED
5000K
Air Handler Discharge Air Temperature 57.33
65
60
55
490
500
510
520
8:52:40 AM PDT

FUSION Training

Project: 730 - Glendale
Scheme: (S130_85) Glendale College

BIM Navigation

- (S130_85)Glendale College
  - (*) = Referenced object
  - (B130_10587) TBD - ELEVATOR
  - (B130_10707) 1 - ADMINISTRA
  - (B130_10708) 15 - ARROYO SE
  - (B130_10709) 51 - SANTA BAR
  - (B130_10710) 17 - CAMINO RE
  - (B130_10711) 5 - SAN RAFAEL
  - (B130_10712) 3 - AUDITORIUM
  - (B130_10713) 21 - NORTH GYM
  - (B130_10714) 34 - EOPS ANNE
  - (B130_10715) 22 - LIBRARY BU
  - (B130_10716) 45 - SAN GABRI
  - (B130_10717) 2 - LOS ROBLES
  - (B130_10718) 14 - SIERRA MA
  - (B130_10719) 23 - AVIATION/A
  - (B130_10720) 18 - ADVANCED
  - (B130_10721) 16 - VERDUGO G
  - (B130_10722) 54 - AVIATION/A
  - (B130_10723) 56 - PARKING S
  - (B130_10724) 47 - SAN FERNA
  - (B130_10725) 10 - CHILD DEVE
  - (B130_10726) 46 - LIFE SKILLS
  - (B130_10727) 50 - CIMMIRUST
  - (B130_10728) 42 - VGT
  - (B130_10729) 4 - STUDENT CE
  - (B130_10730) 55 - HEALTH SCI
  - (B130_10731) 52 - TEMP. M & C
  - (B130_10916) TBD - GARDENE
  - (B130_10917) TBD - New Centr
  - (B130_10918) TBD - Old Centra
  - (B130_10919) TBD - Press Box
  - (B130_10920) TBD - PROFES. D
  - (B130_10921) TBD - RR at Ten
  - (B130_10922) TBD - SARTORIS
  - (B130_10923) TBD - TECHNICA

Sort spaces by space number

Edit Mode | View Mode

ft -1000 -500 0 500

1000 500 0 -500

Keyboard Shortcuts

Site Level Data

- Site
- Site Components
- Buildings
- Background Setting — Unlock

Upload Background
Choose File — no file selected
(Background Name) — Upload

- Map
- Sketches And Annotations
- Preset Views
- Backup / Roll Back
- Import / Export

Import a site / building / space — Import
Export a site / building / space — Export

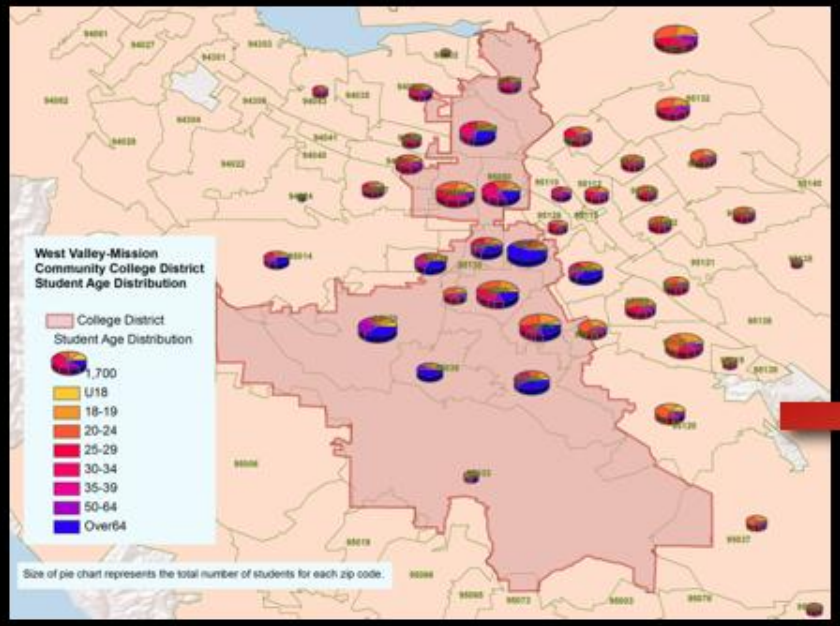
Important NOTICE!

(**NEW:** "Drag" and "Reshape" are turned off by default)

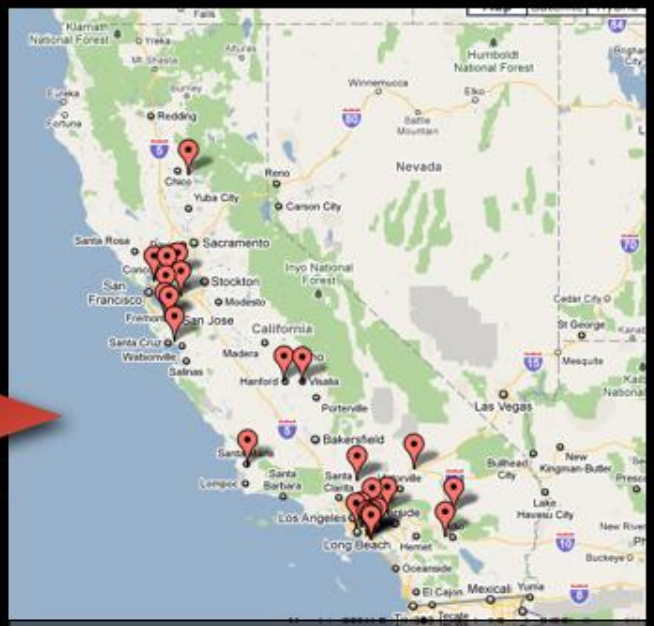
Drag (key D) <> Reshape (key H) <>

Canceled opening the page

1. Define Project



Demographic Data from GIS



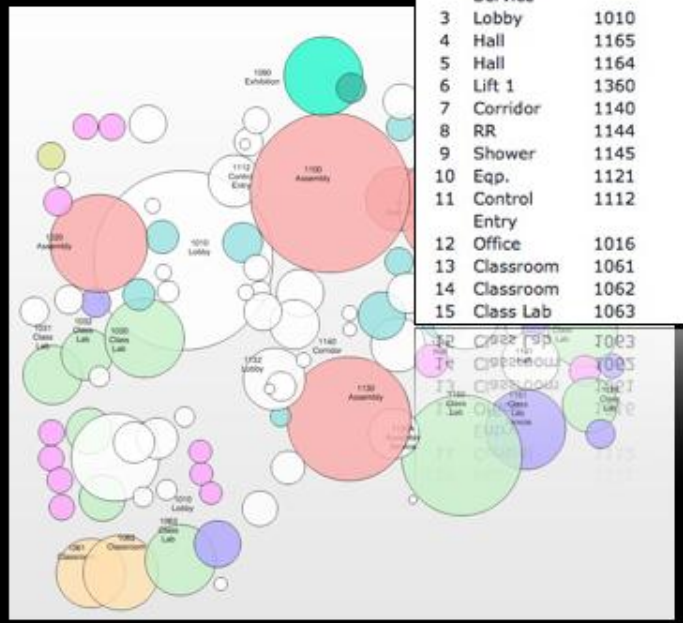
Defines District Need

FUSION+GIS+ ONUMA

ONUMA

3. Design

Key #	Space Name	Space #	SQFT
1st floor			
1	Restroom	1105	55
2	Assembly Service	1107	41
3	Lobby	1010	6,135
4	Hall	1165	367
5	Hall	1164	180
6	Lift 1	1360	22
7	Corridor	1140	562
8	RR	1144	43
9	Shower	1145	34
10	Eqp.	1121	77
11	Control Entry	1112	521
12	Office	1016	134
13	Classroom	1061	914
14	Classroom	1062	1,0
15	Class Lab	1063	952

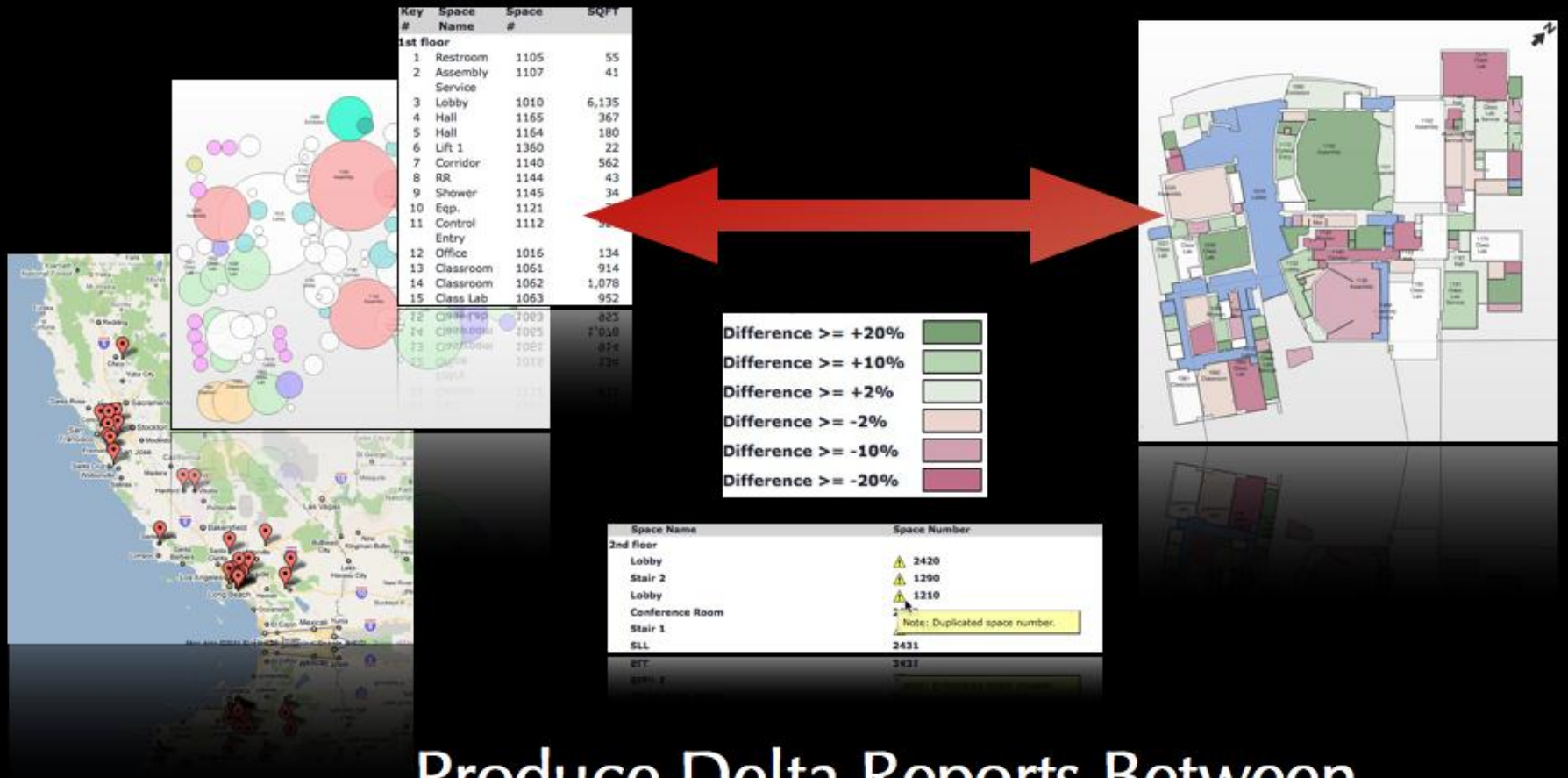


District Planning Proposal Data

Design Team Works in BIM or CAD

ONUMA

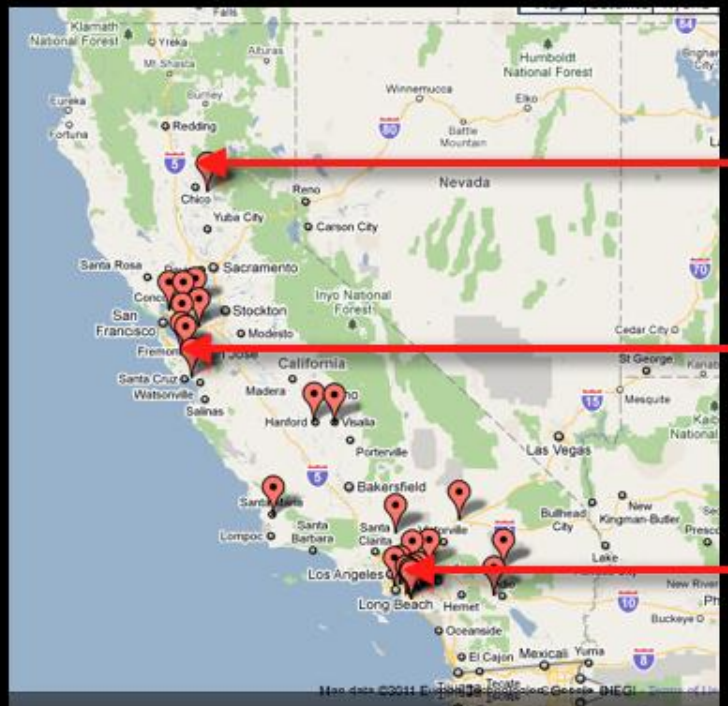
5. District Review



Produce Delta Reports Between Program Requirement and Design

ONUMA

6. As Built



Project 1

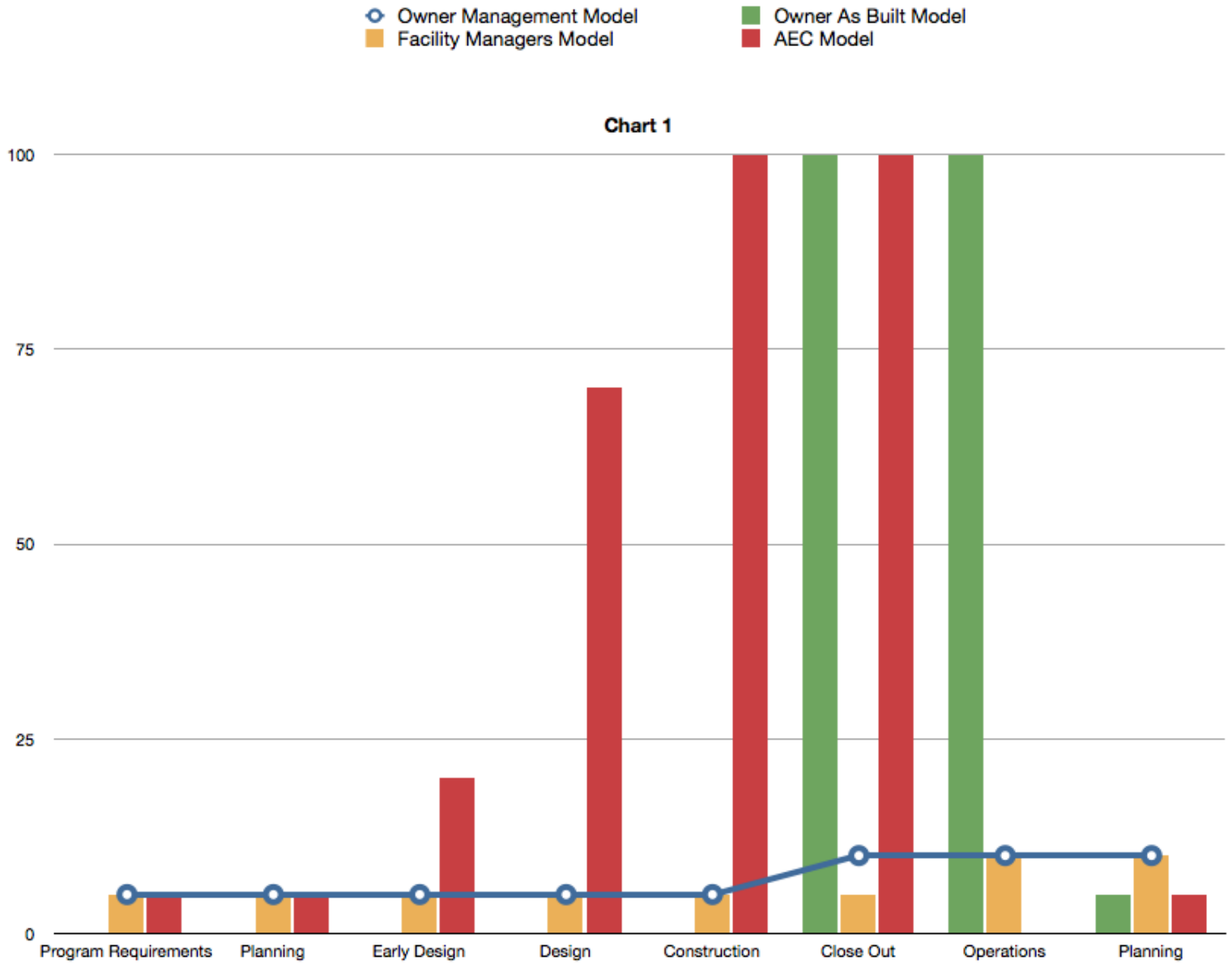
Project 2

Project 3

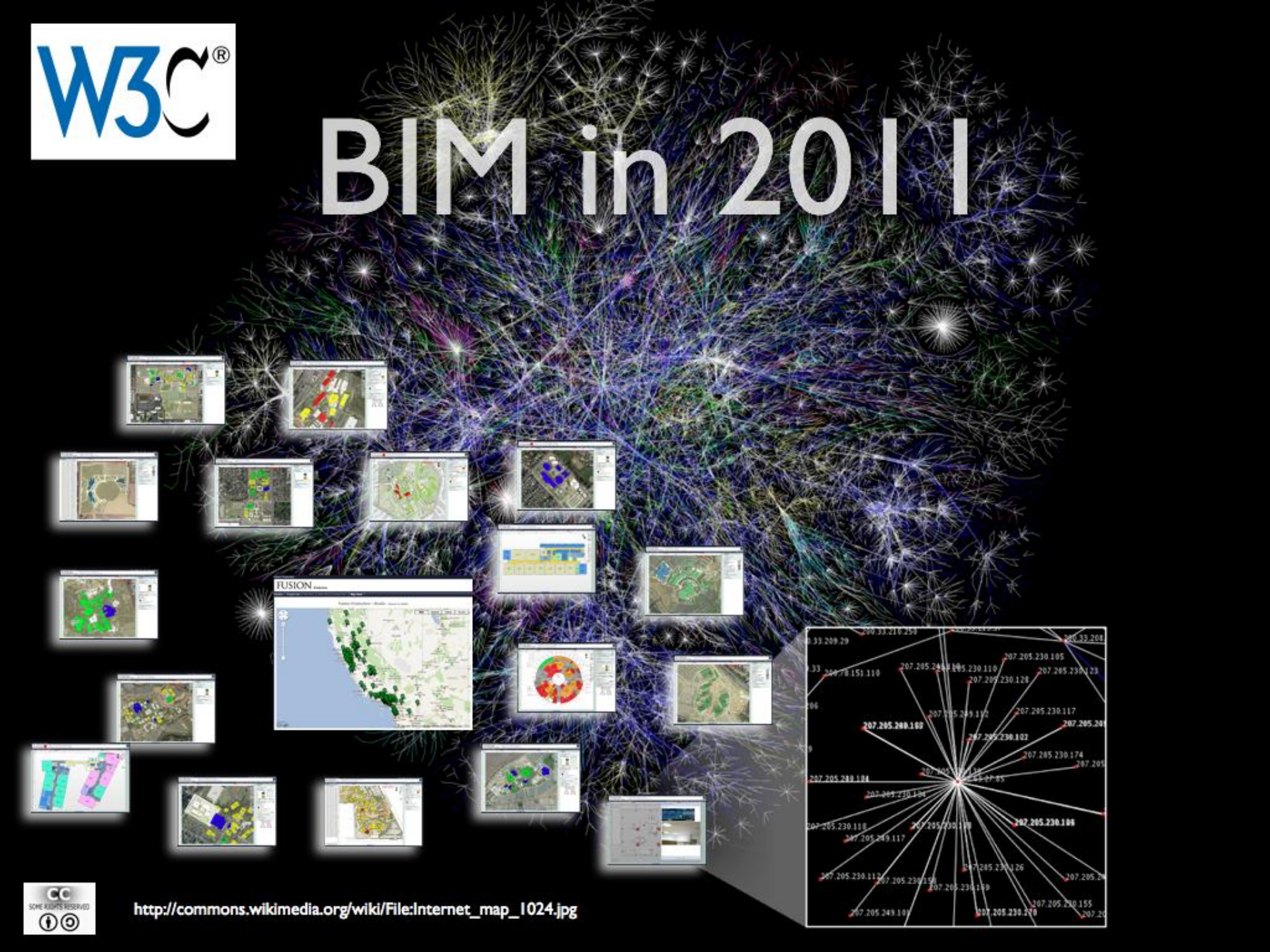
FUSION+GIS+ONUMA
gets more refined with
each project

Completed Project data from
Contractors Delivered
back as

ONUMA


Owner Management Model
Facility Managers Model
Owner As Built Model
AEC Model
Chart 1
100
75
50
25
0
Program Requirements
Planning
Early Design
Design
Construction
Close Out
Operations
Planning

BIM in 2011



http://commons.wikimedia.org/wiki/File:Internet_map_1024.jpg

design

akes a diff

BIM STORM

BIMEDU STORM

FOUNDATION *for* CALIFORNIA COMMUNITY COLLEGES

MIRACOSTA COLLEGE

LOS ANGELES COMMUNITY COLLEGE DISTRICT

BIM STORM HEALTH STORM

KAISER PERMANENTE®

BIMStorm.com

http://BIMStorm.com
http://Onuma.com
Videos:
http://vimeo.com/16687982
http://vimeo.com/album/1482178

Kimon Onuma, FAIA
President - Onuma, Inc.
http://Onuma.com

AIA

Good design
makes a difference™


Good design
makes a difference™
AIA

BIM Scorecard:
Measuring the Values of BIM

Calvin Kam PhD, AIA, PE

Stanford University – CIFE
bimSCORE, Inc.
AIA-TAP

Tony Rinella Associate AIA

bimSCORE, Inc.
DESIGN[realized]
AIA-TAP

How do we evaluate BIM?

Jury's Choice, Expert's Choice, Professional's Choice…

Subjective, Science & Consensus

How do we gather, present and learn from the evidence?


National Institute of
BUILDING SCIENCES
Facilities Information Council
National BIM Standard


BIM
operate.construct.design.plan.
PROJECT
EXECUTION
PLANNING
GUIDE


WEBCOR
BUILDERS


McGraw-Hill
CONSTRUCTION


BIMe

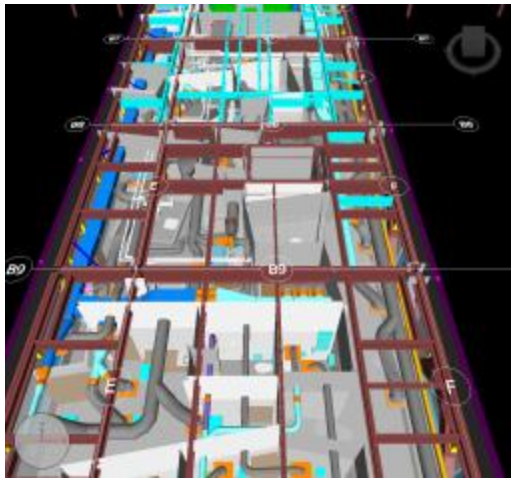

Autodesk

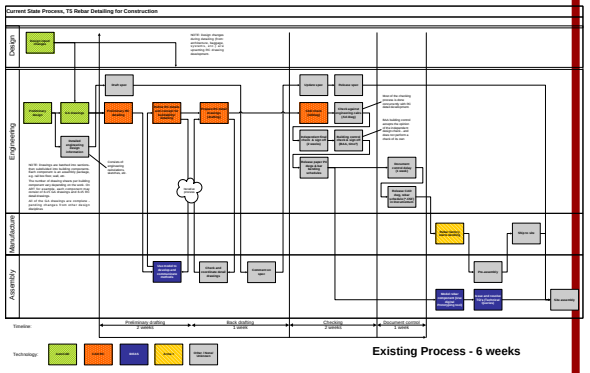

VICO
SOFTWARE
Integrating Construction

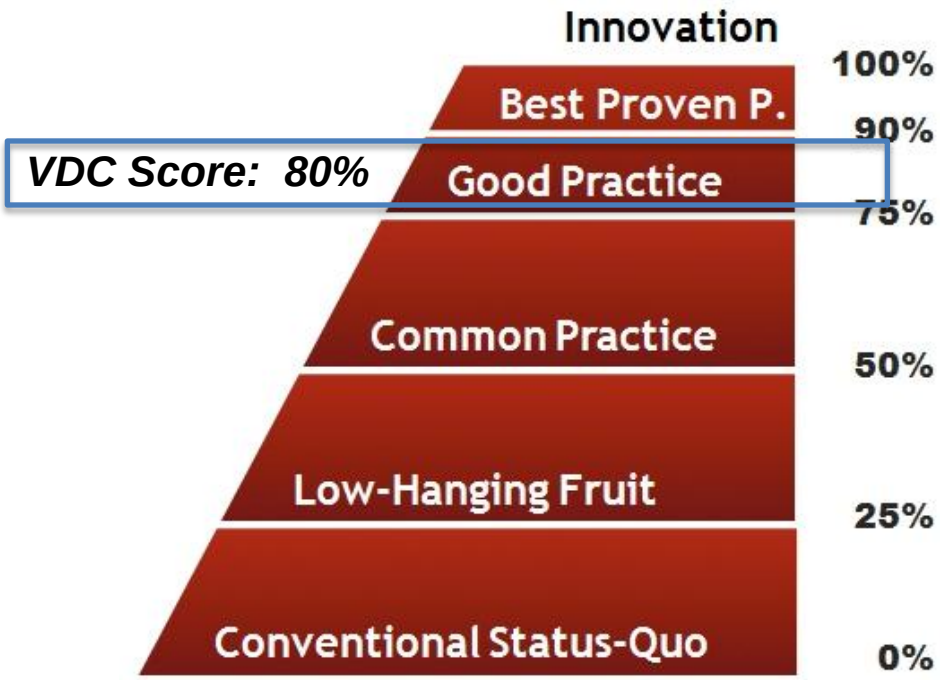

AIA


CIFE
Center for Integrated Facility Engineering

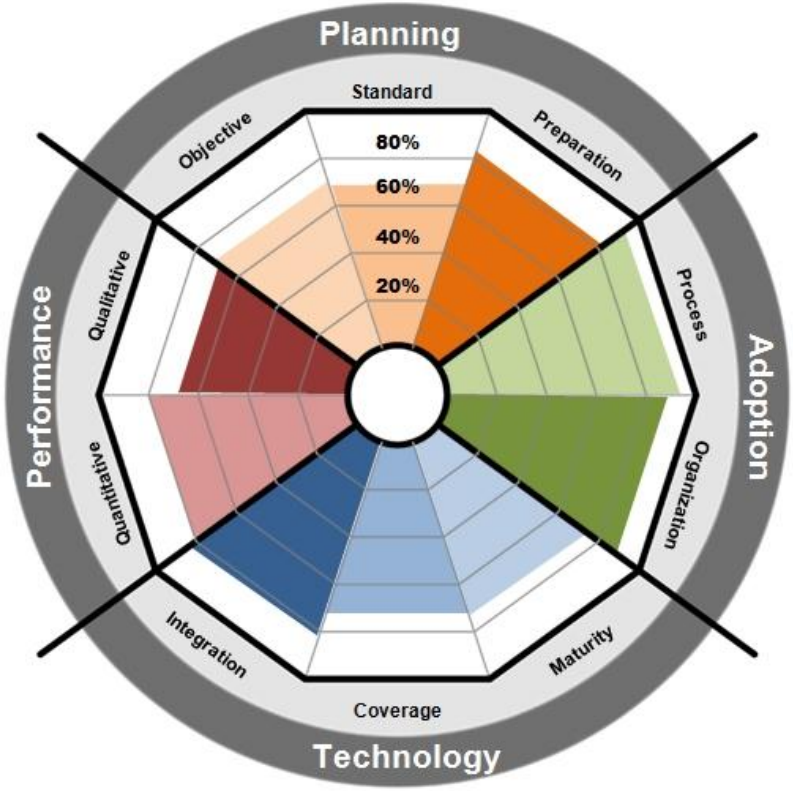
Virtual Design and Construction (VDC)



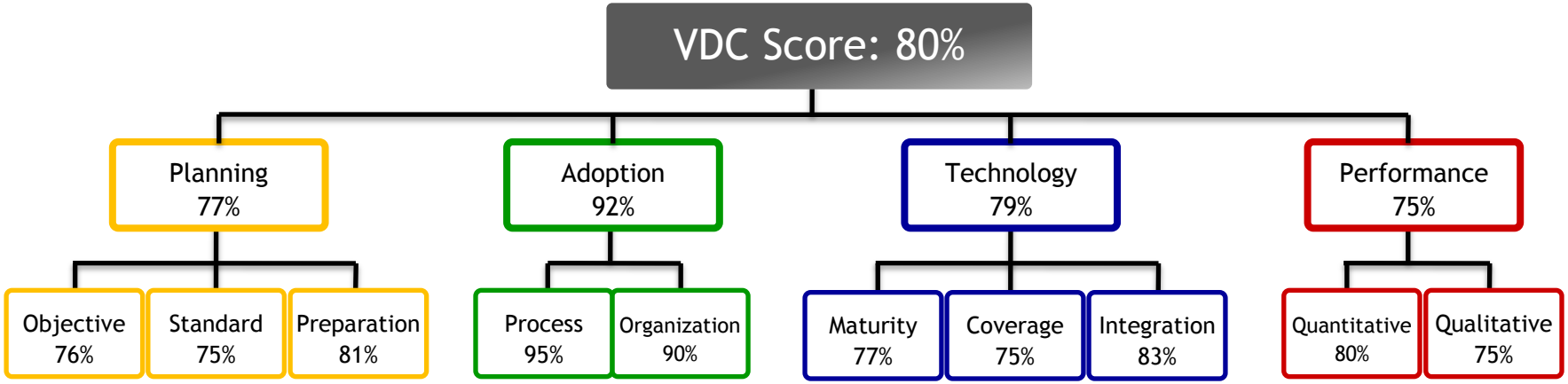


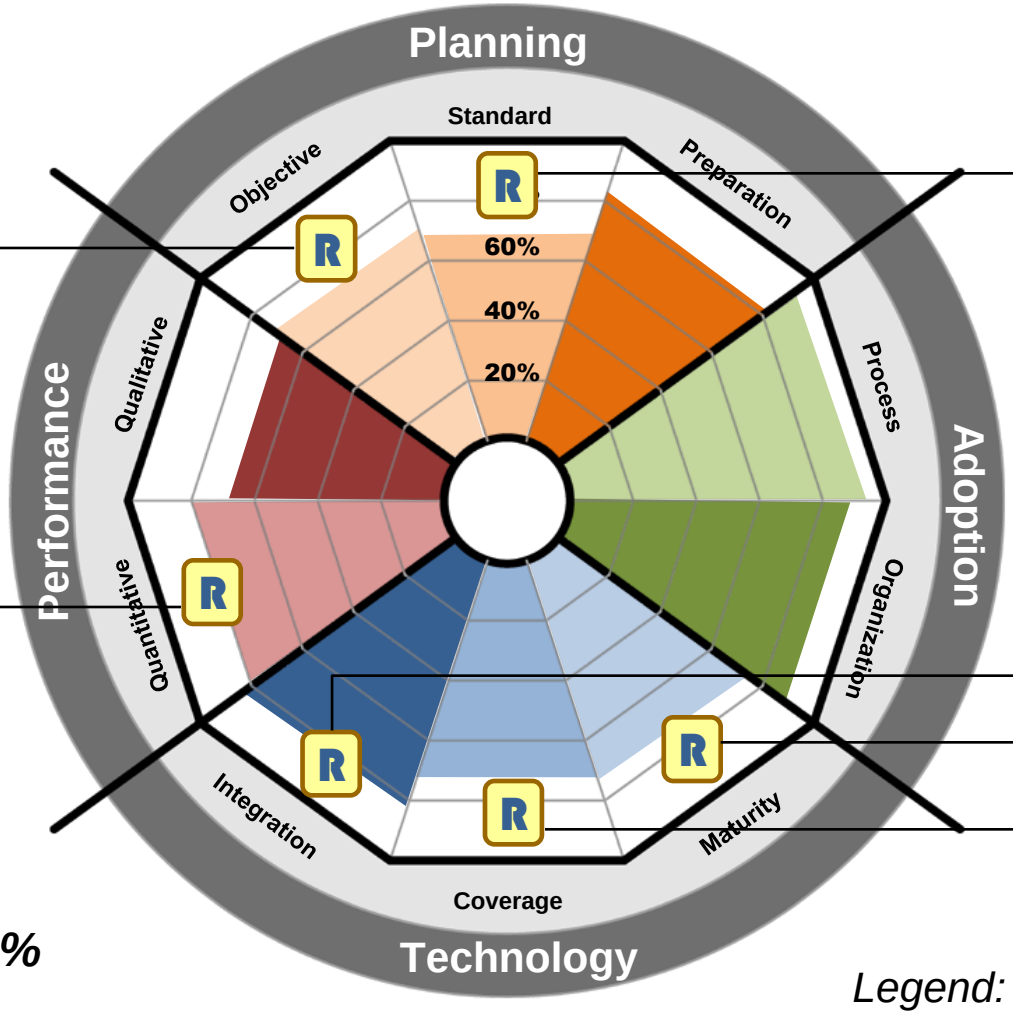


VDC Score: 80%



Confidence Level: 30%


VDC Score: 80%
Planning
77%
Adoption
92%
Technology
79%
Performance
75%
Objective
76%
Standard
75%
Preparation
81%
Process
95%
Organization
90%
Maturity
77%
Coverage
75%
Integration
83%
Quantitative
80%
Qualitative
75%



Establish more quantitative objectives

Improve cost performance to maximize profit sharing

Establish guideline for off-site fabrication

Use VDC applications for design reviews

Consider VDC for O&M phase

Overall Score: 80%

Confidence Level: 30%

Legend: R

Recommendation

2011 TAP Leadership Team

Calvin Kam
2011 chair

David Scheer
2012 chair

Kimon Onuma
2013 chair

Stephen Hagan

Kristine Fallon

Tony Rinella

Active Past Chairs

Brian Skripac

Jeff Ouellette

Karen Kensek

Luciana Burdi

Marty Doscher

Mike Kenig

Pete Evans

Results of 22 Projects

No.	Project Name	Leads	Type	# of Interviewees	VDC Score
1	Sutter Medical Center Castro Valley	DPR	Medical	3	80%
2	UCSF Mission Bay	DPR	Medical	2	71%
3	EGWW	GSA	Federal Bldg.	1	70%
4	Camelview	Optima	Residential	1	66%
5	Alta Bates Summit Medical Center	DPR	Medical	1	57%
6	Southern Polytechnic University	DPR	Lab	1	54%
6	United Therapeutics	DPR	Office	1	54%
6	McCoy FB Modernization	GSA	Federal Bldg.	1	54%
9	Palomar Pomarado	DPR	Medical	1	52%
9	Glodon Headquarters	Glodon	Office	4	52%
9	NREL	NREL	Lab	4	52%
12	Sensitive Project	GSA	Federal Bldg.	1	49%
12	Journey to Madagascar	Scenario	Theme Park	1	49%
14	Lucille Packard Children's Hospital	DPR	Medical	1	46%
15	Chicago Federal Center	GSA	Federal Bldg.	1	45%
16	Ten West Jackson	GSA	Federal Bldg.	1	44%
17	Byron Rogers Federal Building	GSA	Federal Bldg.		43%
18	San Diego Courthouse	GSA	Courthouse	3	39%
19	Richard H Poff	GSA	Courthouse	1	38%
20	Federal Center South / USACE	GSA	Federal Bldg.	3	37%
20	San Antonio Courthouse	GSA	Courthouse	1	37%
22	Building 105	GSA	Federal Bldg.	1	36%

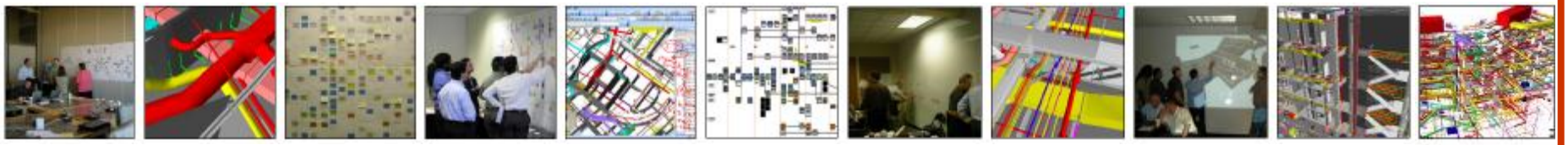
AIA BIM Award

AIA BIM Award

AIA BIM Award

AIA BIM Award

The VDC Scorecard of Sutter Medical Center Castro Valley



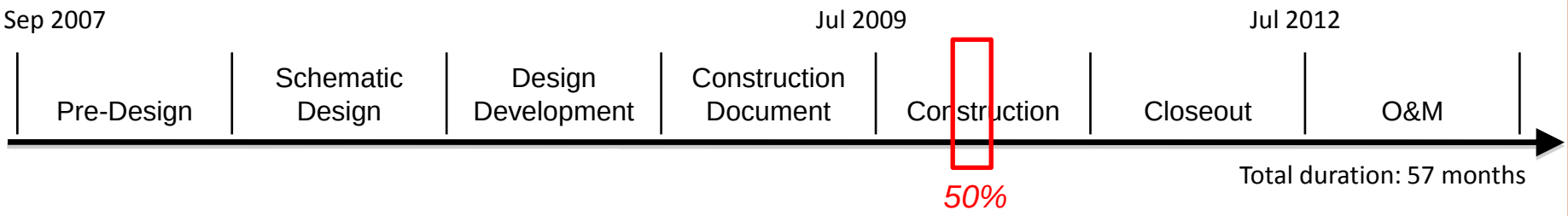
Industry Contacts: Josh Odelson (DPR), Michael Pearson (DPR), Matthew Jogan (Ghafari)
Stanford: Calvin Kam, Min Song

Project Background

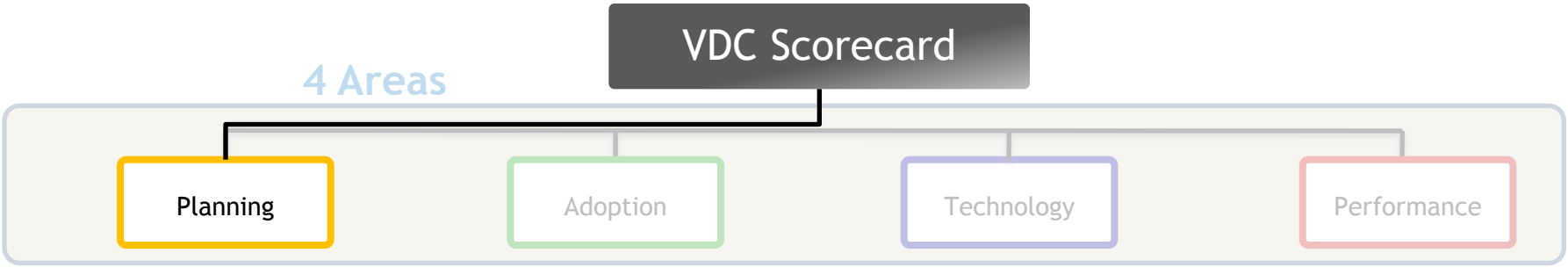
Project outline

- Facility Type: Hospital
- Project Type: New Construction
- Size (gsf): 230,000 gsf
- Construction Budget: $320 Million
- Project Team: 11 Parties
- Project Status:

3D rendering of the SMCCV project
(Courtesy of DPR Construction, Inc.)



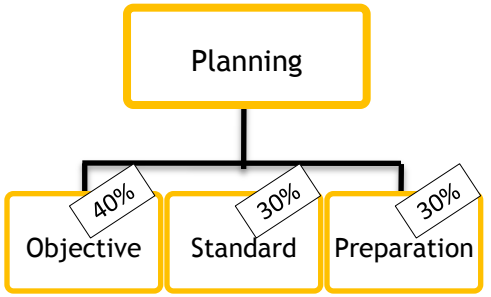
Planning Area

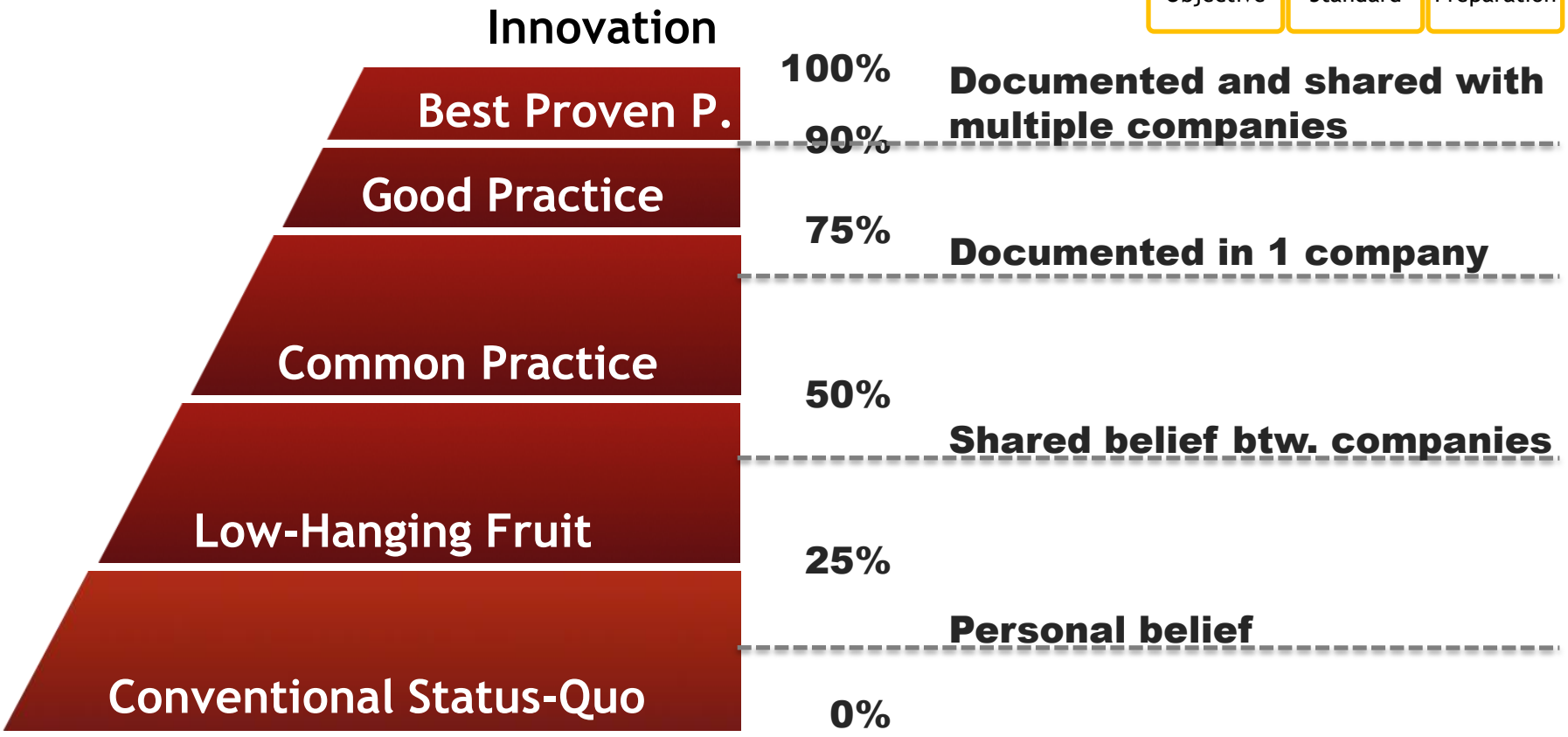


- Establish specific and achievable objectives (quantitative or measurable)
- Follow and contribute to project/program/enterprise guidelines
- Dedicate resources for VDC implementation

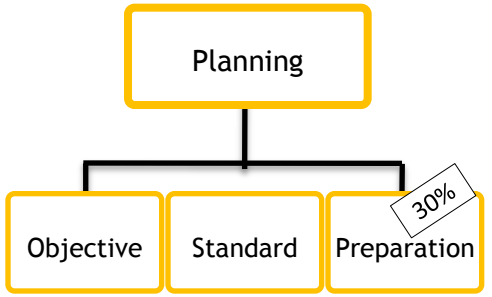
Scoring

- Objectives Documented?





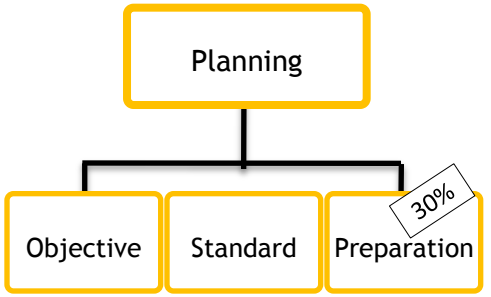
Preparation



- VDC Budget

Terms Used	Examples
Software	VDC applications such as Revit, ArchiCAD, Navisworks, and Innovaya.
Hardware	High-performance hardware primarily used for VDC such as Smart Board, computers for 3D modeling, model servers, 3D laser scanning equipments, and field survey equipments.
VDC Specialists	VDC specialists such as VDC engineer, VDC manager, and VDC consultant.

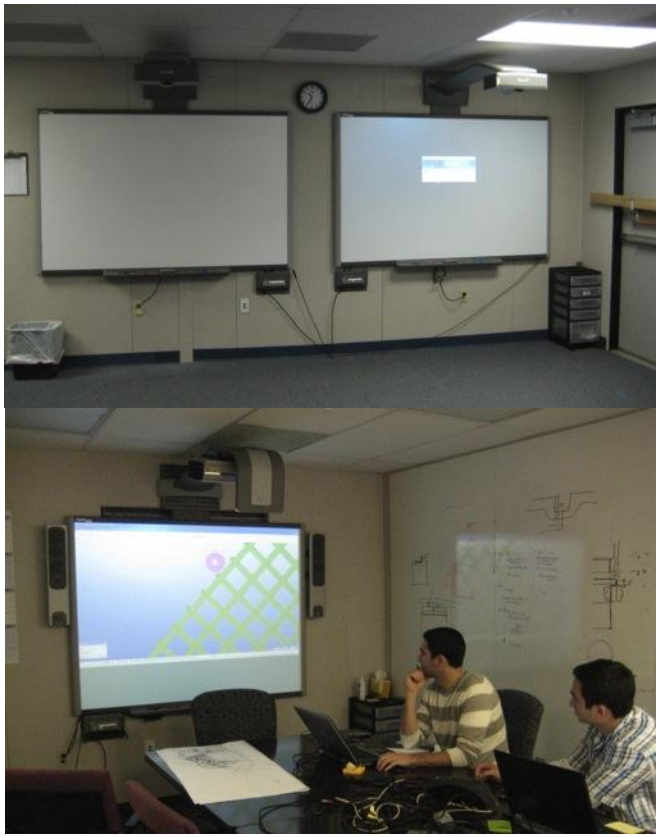
Planning



- Interaction (most widely utilized means)

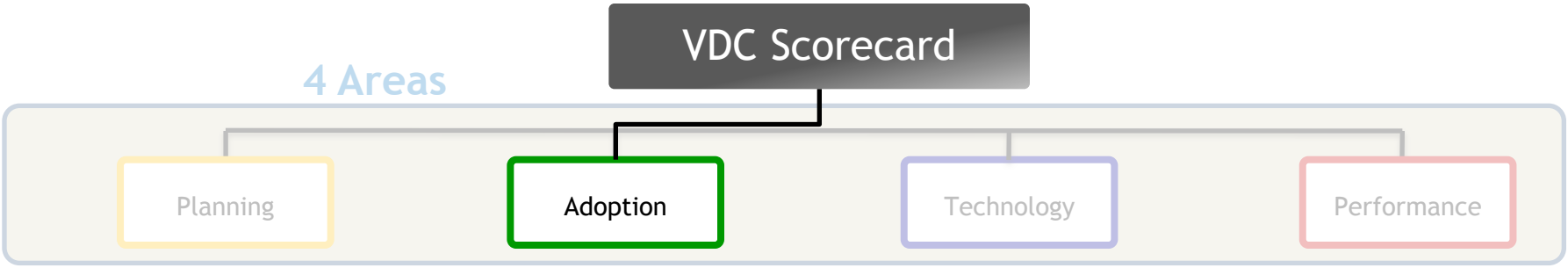
The Big Room Concept

The project team is distributed in various cities including Sacramento, Pasadena, Redwood City, Utah, Phoenix, Dearborn, among others. The team needed to come up with effective strategies for collocation (a big room) without having to relocate the entire team into one location for an extended period of time which is not only costly but impractical given that there are over 240 people working on the project.



References:
DPR, 2010 AIA BIM Awards Submittal

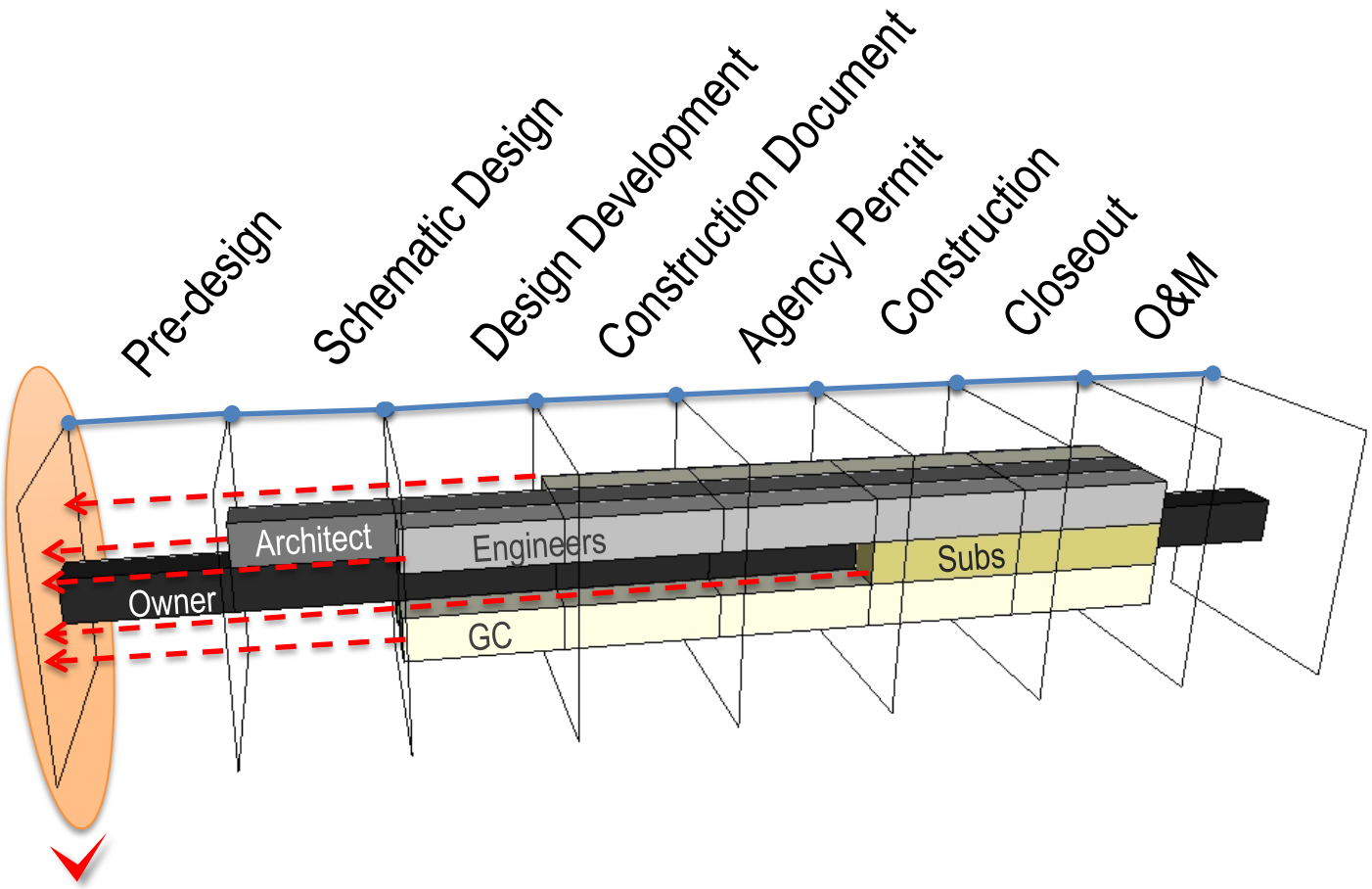
Adoption Area



- People and Processes
- Broader VDC adoption across Processes (project phases)
- Deeper VDC adoption Across Organizations (teams and individuals)
- Offer VDC training on a regular basis
- Communicate among VDC adopters and resisters

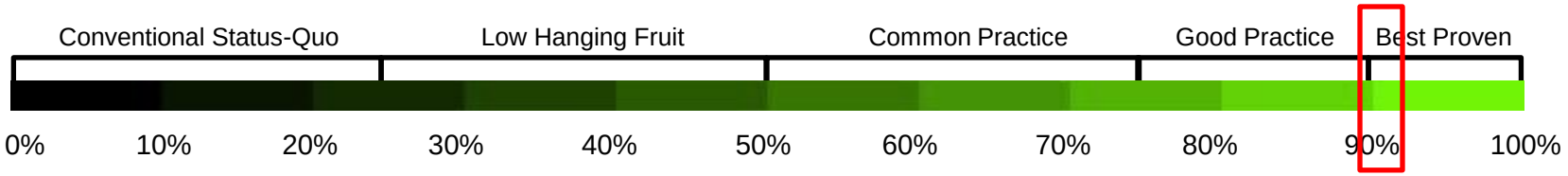
Adoption Area

- Early adoption



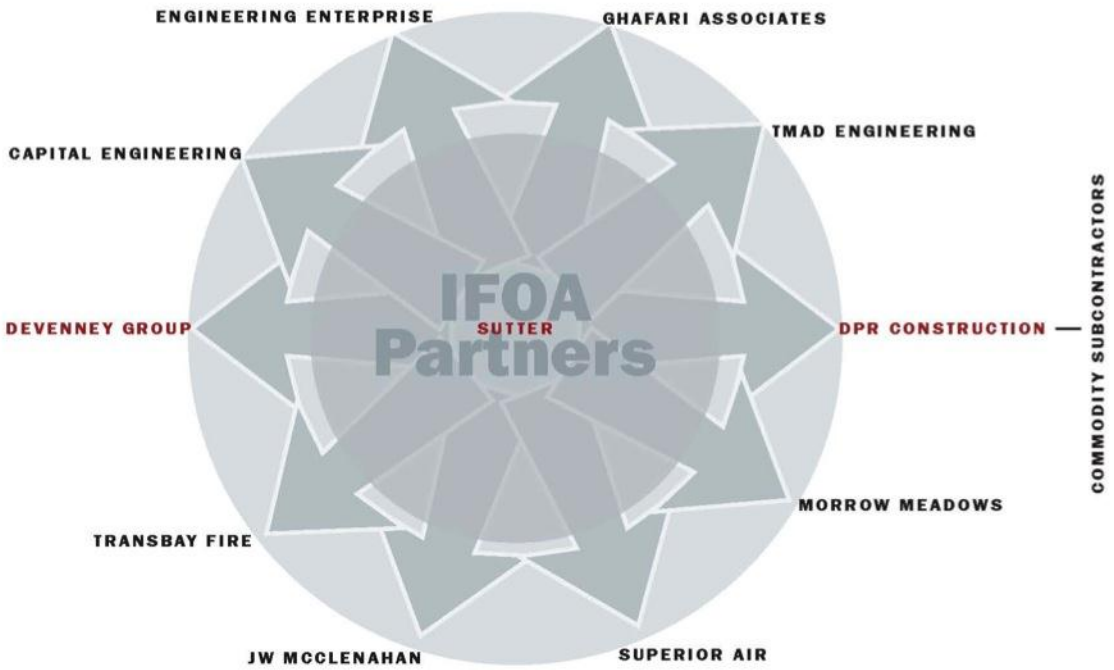
VDC Implementation

Adoption Area – SMCCV Case



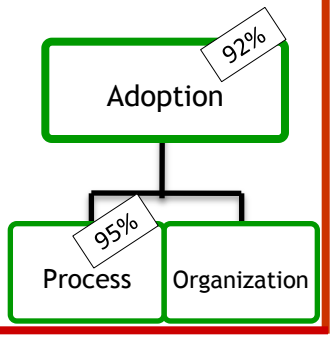
92%: Area Score

Process Dimension

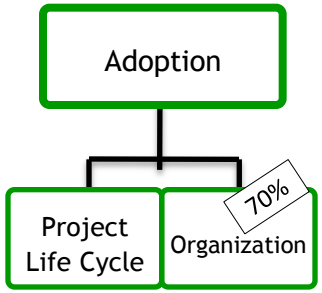


Alignment / Integration / Collaboration through IFOA
(Courtesy of DPR Construction, Inc.)

- Through IPD, the team could collaboratively and efficiently expand the breadth of VDC application from the early phase of the project.



Basis of Scoring - Percentile

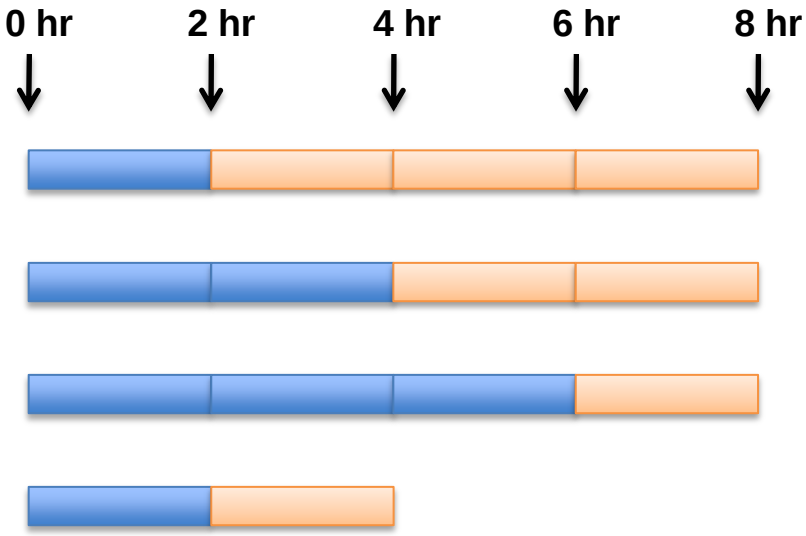


- # of FTE Involved with VDC / Total # of FTE

Example

Peak Time: when construction is progressed 80%

Legend: **Time spent with VDC applications** **Time spent w/o VDC applications**

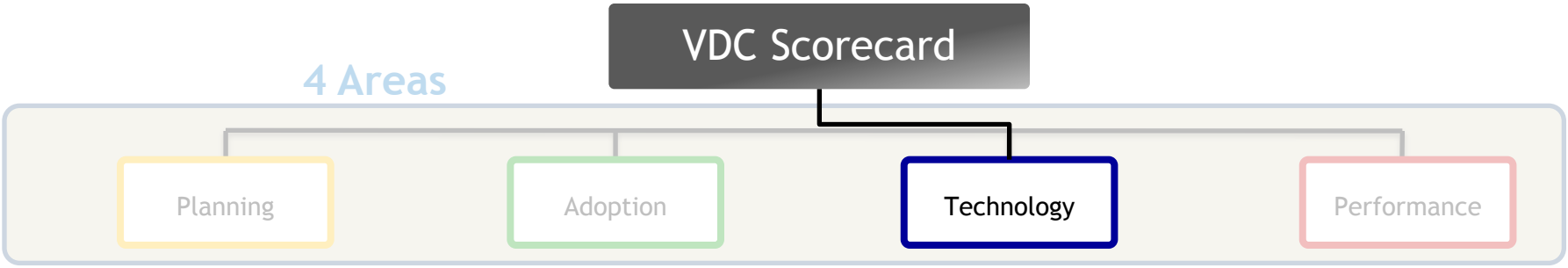


Total # of FTE: ***3.5***

FTE # involved with VDC: ***1.75***

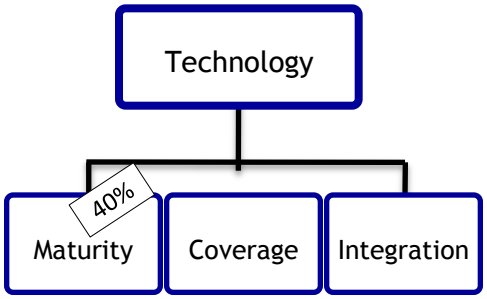
Note: Exclude construction crews

Technology Area



- Adopt mature VDC software applications
- Align technology applications with planning objectives
- Account for interoperability among VDC software applications
- Share information effectively in a scalable manner
- Define appropriate levels of detail in VDC models

Basis of Scoring - Percentile

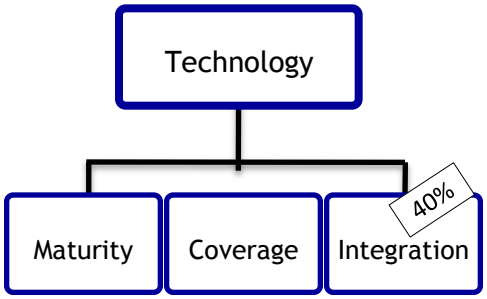


Model Uses

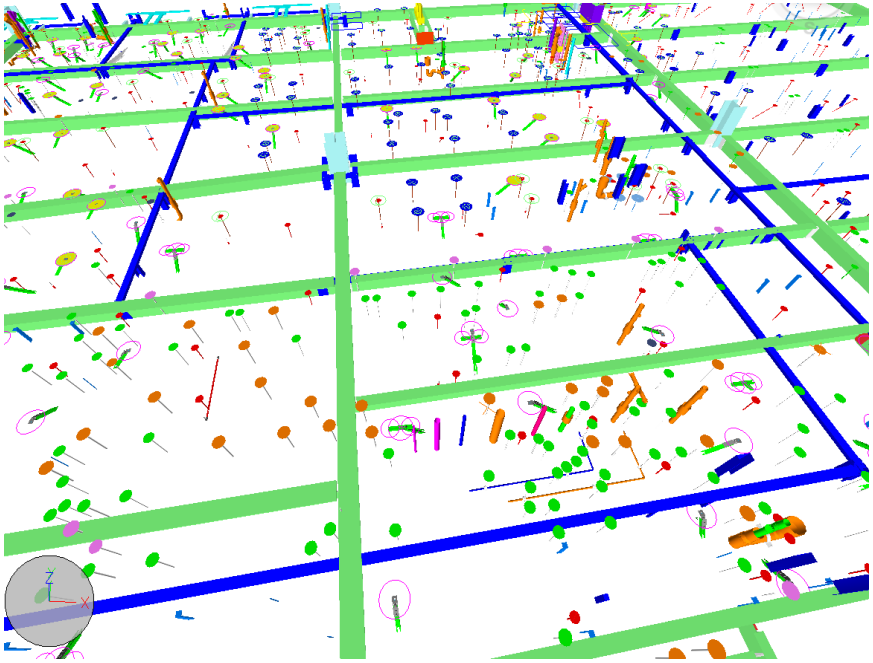
Level	Examples
1. Visualization Models are created for visualization purposes (Accurate geometric information not required)	3D rendering Mass model study
2. Documentation Models are created for documentation with accuracy	Design/construction documents 3D laser scanning for existing condition
3. Model-Based Analysis Created models are reused for a single-discipline analysis	Spatial validation Structural analysis Estimating
4. Integrated Analysis Models/analyses of multiple stakeholders are interoperated for cross-discipline collaboration	Clash detection Integrated 4D/5D models
5. Automation & Optimization Routine analyses or fabrications are automated	Off-site fabrication Automated code-checking

Basis of Scoring - Percentile

- Level of Details (LoD): Average LoD



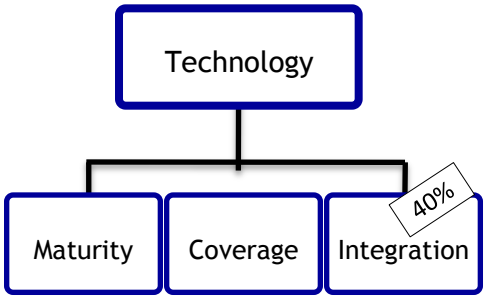
Model to Field: Deck Inserts

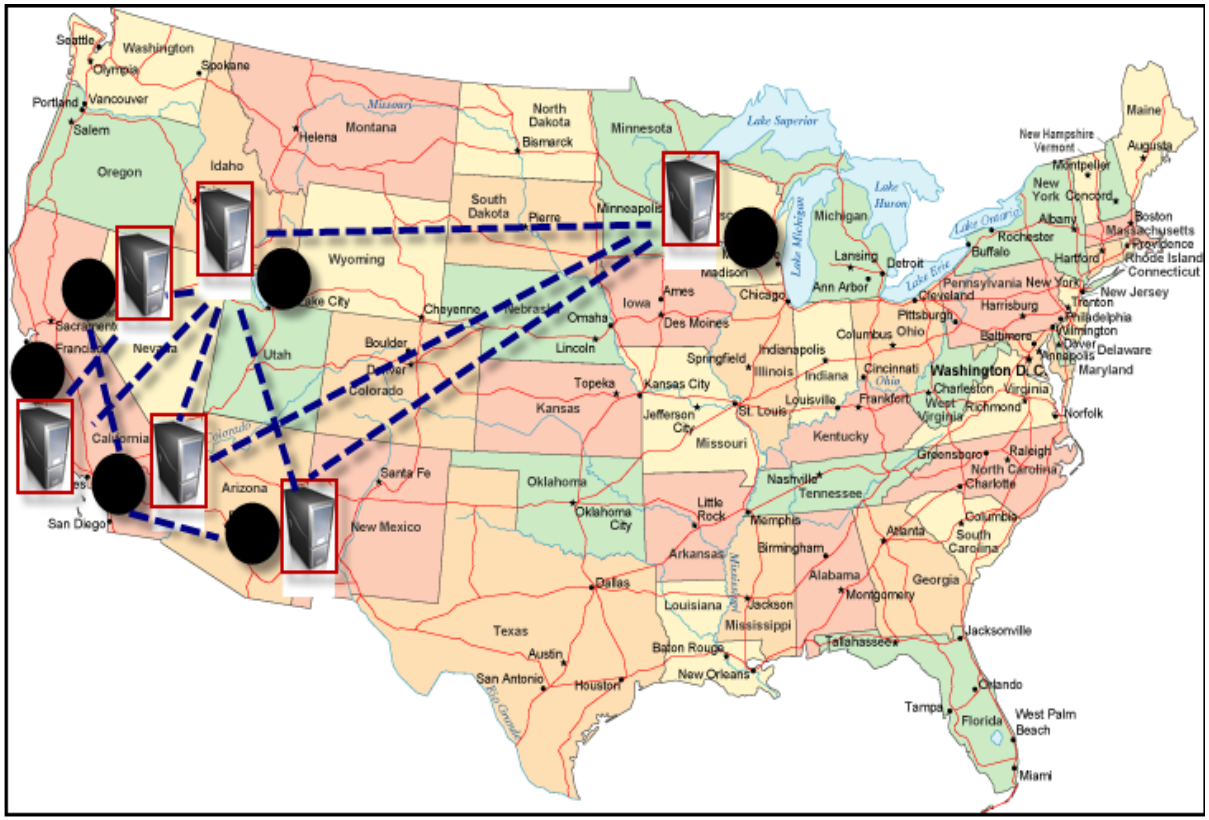


References:
DPR, 2010 AIA BIM Awards Submittal

Basis of Scoring - Percentile

- Data Sharing Method: Average Value





- Models behind Firewalls
- Overnight secure sync
- Quick Local Access
- Distributed Collaboration
- Up to the minute Information for everyone
- Access Control with different levels (Read / Write)
- Check-In / Check-Out Procedures

References:
DPR, 2010 AIA BIM Awards Submittal

Technology Area - SMCCV Case

Integration Dimension

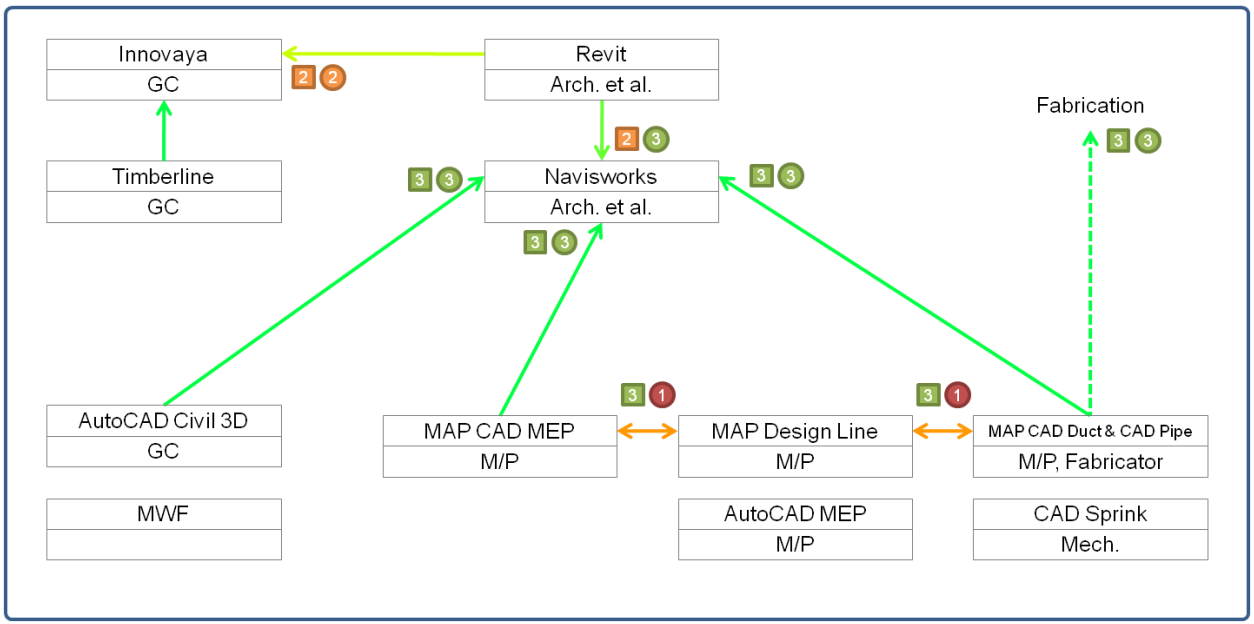
Model Exchange Map

3 All elements exported/imported
2 Partial elements exported/imported
1 Few elements exported/imported

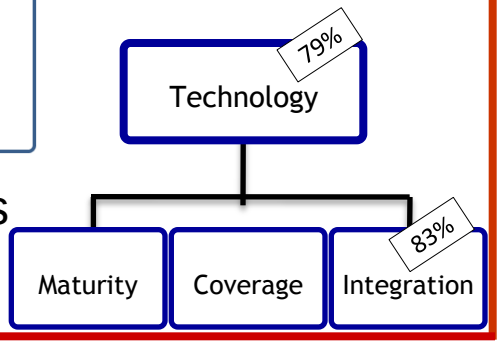
3 No information loss
2 Some information loss
1 Severe information loss

e.g. Model use efficiency rate: 3 x 2 = 6

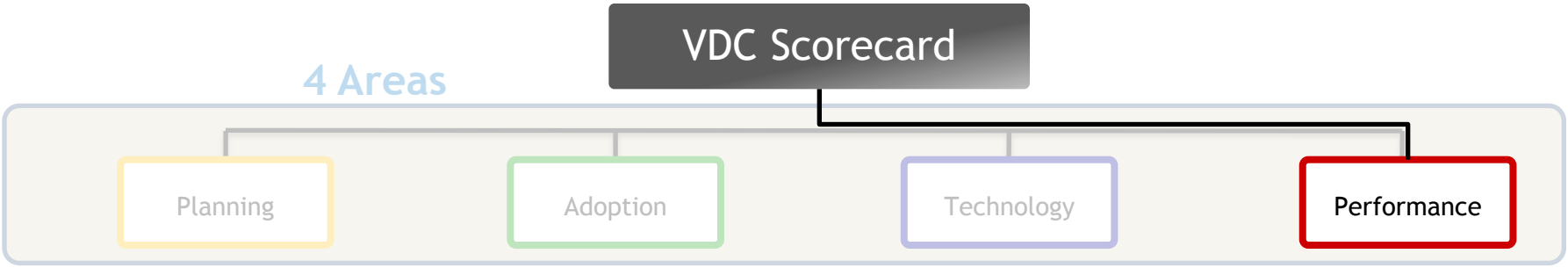
Efficiency rating
9
6
4
3
2
1



- Software vendor, TSI, had problems advancing models through the steps of design-fabrication-design.



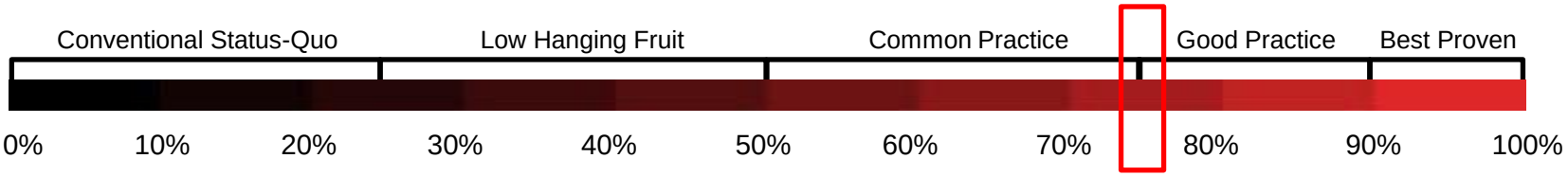
Performance Area



- Report measurable performance metrics through VDC

  e.g. reduced cost, improved building performance, reduced design error
- High level of satisfaction in the “Diamond of User Emotion”
- Positive Qualitative Feedback by Multiple Stakeholders

Performance Area – SMCCV Case

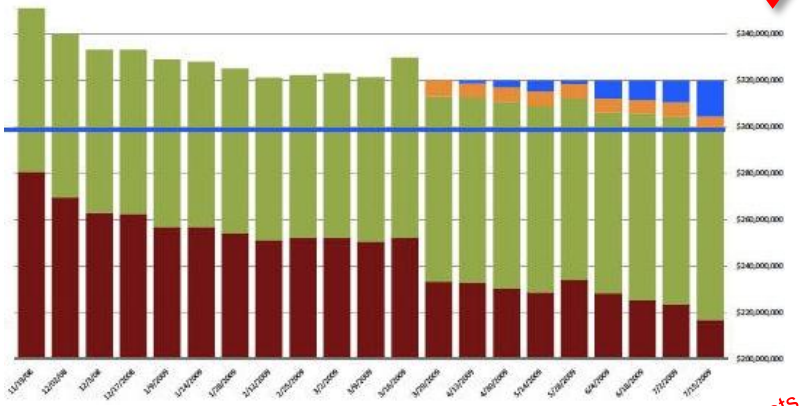


75%: Area Score

Quantitative Dimension

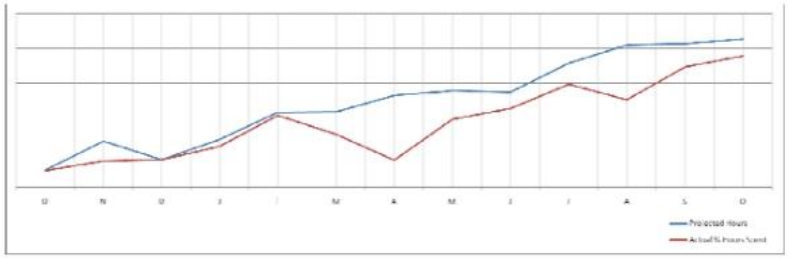
[Cost] (Courtesy of DPR Construction, Inc.)

Does not meet expectation



[Design Hours] (Courtesy of DPR Construction, Inc.)

Meets expectation



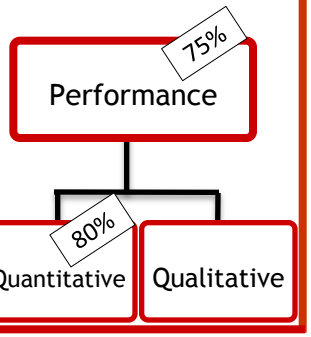
Monthly trending of architectural design hours against baseline

[Permitting] Meets expectation

24 months faster than what had been done in the past for comparable projects.

[Schedule] Meets expectation

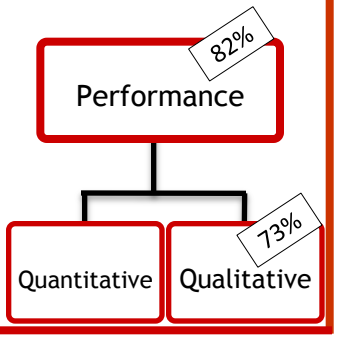
30% faster than what had been done in the past for comparable projects.



Performance Area

Qualitative Dimension

Diamond of User Emotion, BJ Fogg

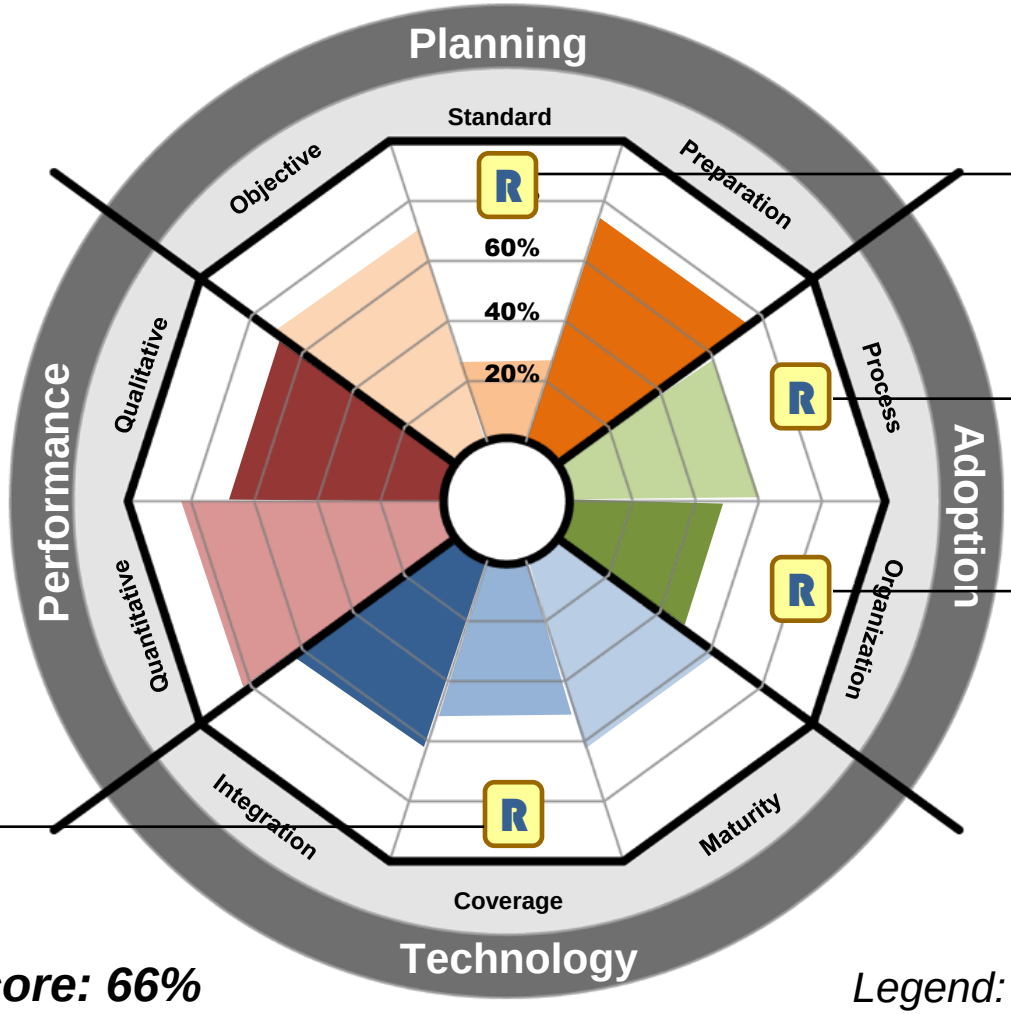


Optima Camelview, Arizona

David Hovey FAIA

Camelview - Recommendations

Summary



Establish VDC guideline

Engage other stakeholders (MEP) earlier

Overcome resistance to VDC implementation

Be more consistent about VDC application throughout the life cycle (later phases have implemented VDC on a larger scale)

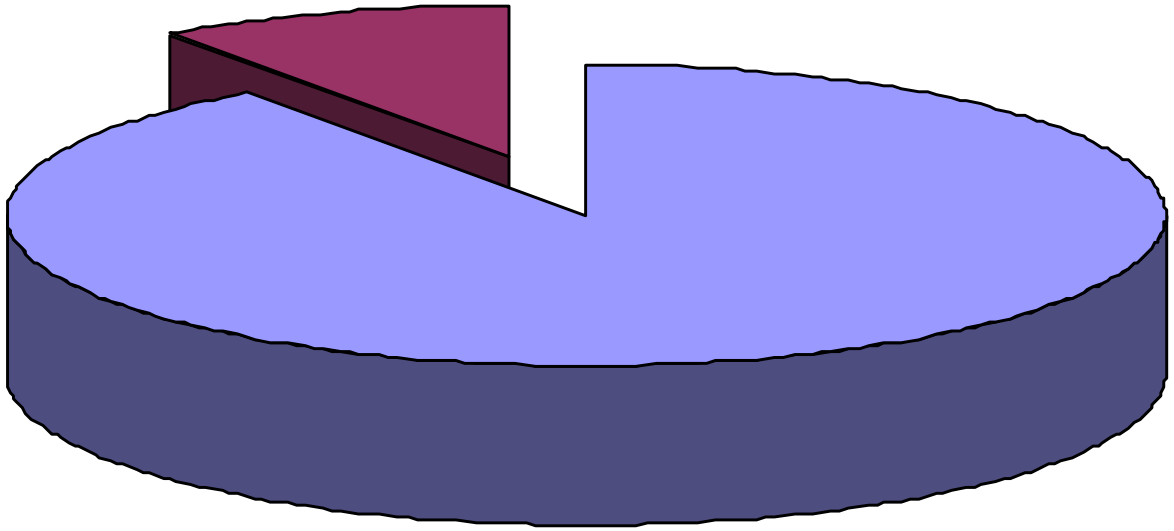
Overall Score: 66%

Confidence Level: 24%

Legend: R

Recommendation

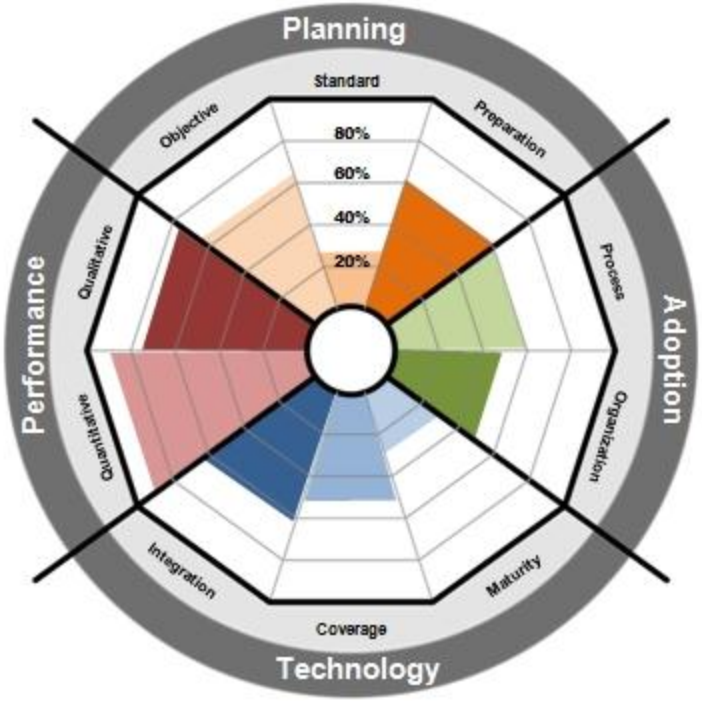
10% technology



90% sociology

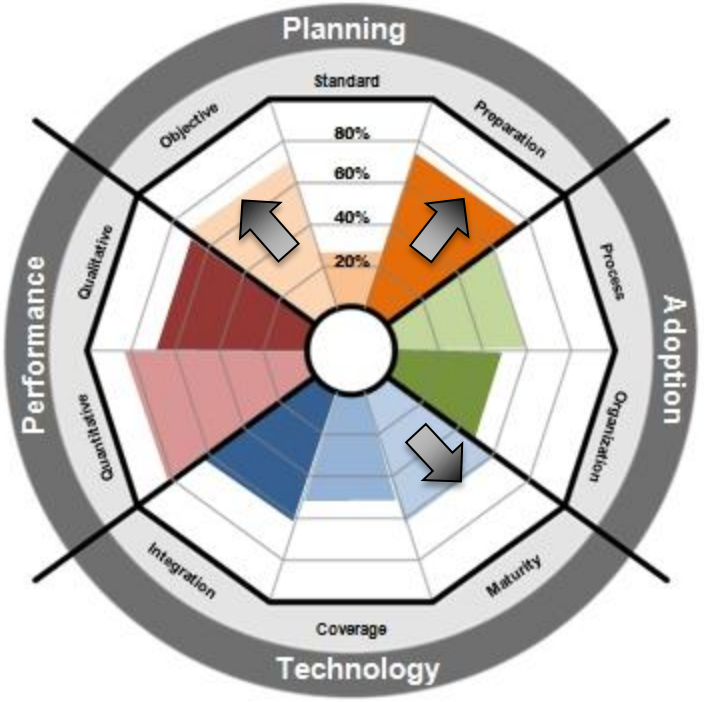
Camelview - Performance Progression

- Phase 1 and 2

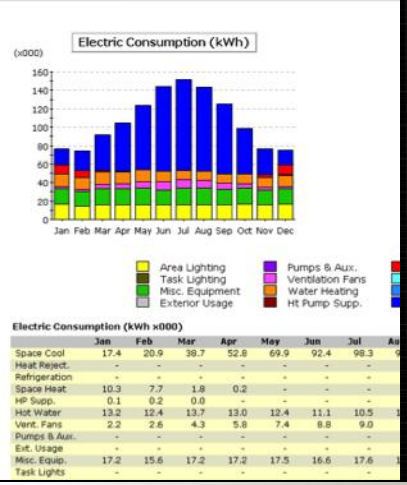


Overall Score: 62%

- Phase 3

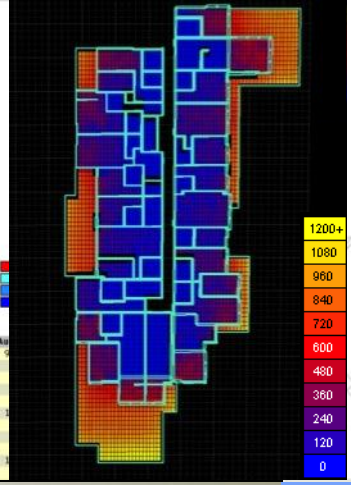


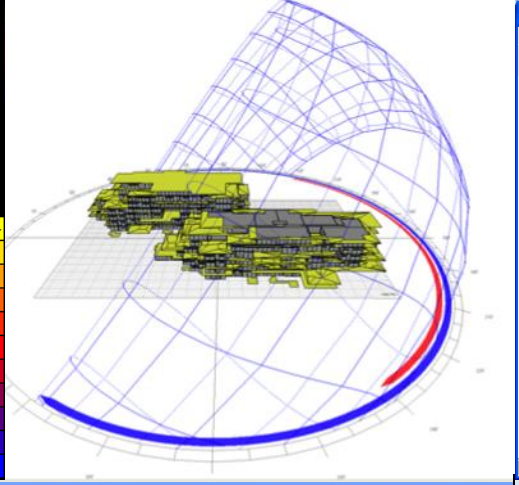
Overall Score: 66%

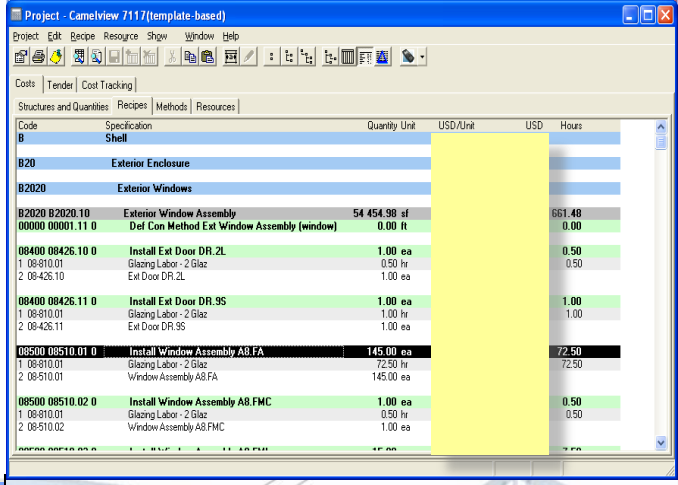


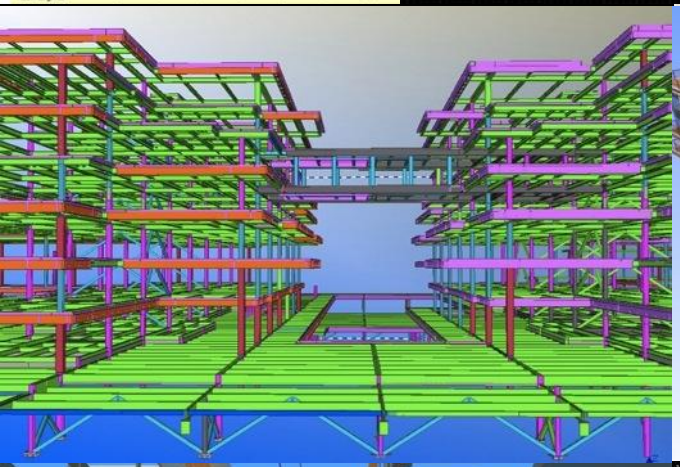
Electric Consumption (kWh x000)

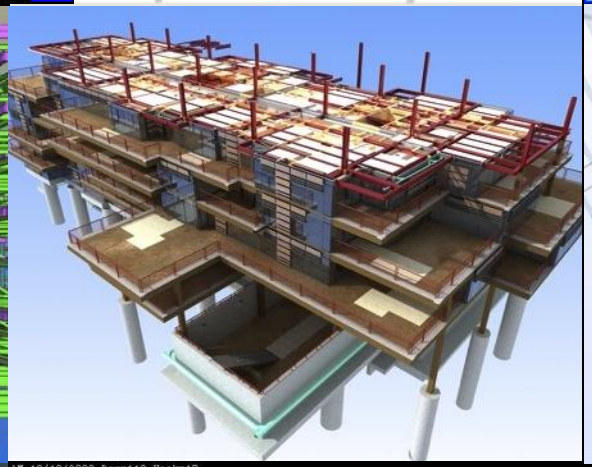
	Jan	Feb	Mar	Apr	May	Jun	Jul
Space Cool	17.4	20.9	38.7	52.8	69.9	92.4	98.3
Heat Reject.	-	-	-	-	-	-	-
Refrigeration	-	-	-	-	-	-	-
Space Heat	10.3	7.7	1.8	0.2	-	-	-
HP Supp.	0.1	0.2	0.0	-	-	-	-
Hot Water	13.2	12.4	13.7	13.0	12.4	11.1	10.5
Vent. Fans	2.2	2.6	4.3	5.8	7.4	8.8	9.0
Pumps & Aux.	-	-	-	-	-	-	-
Ext. Usage	-	-	-	-	-	-	-
Misc. Equip.	17.2	15.6	17.2	17.2	17.5	16.6	17.6
Task Lights	-	-	-	-	-	-	-

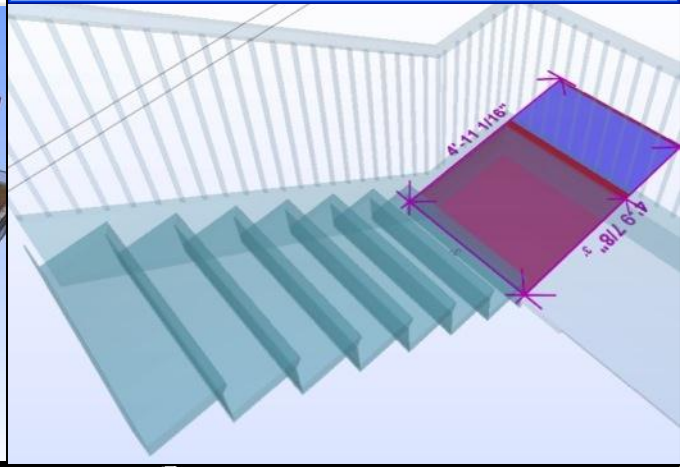


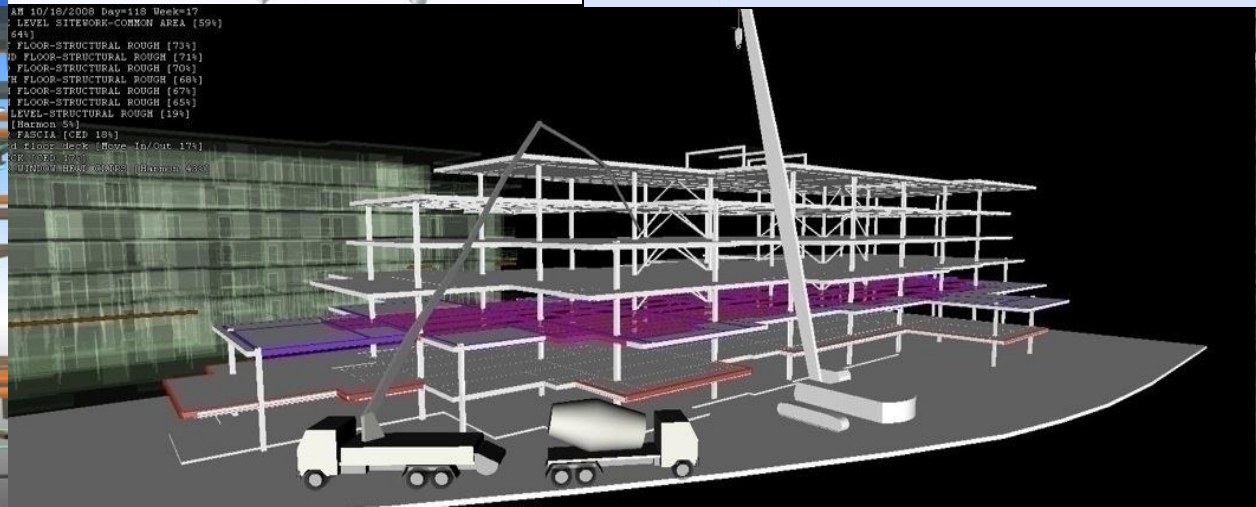




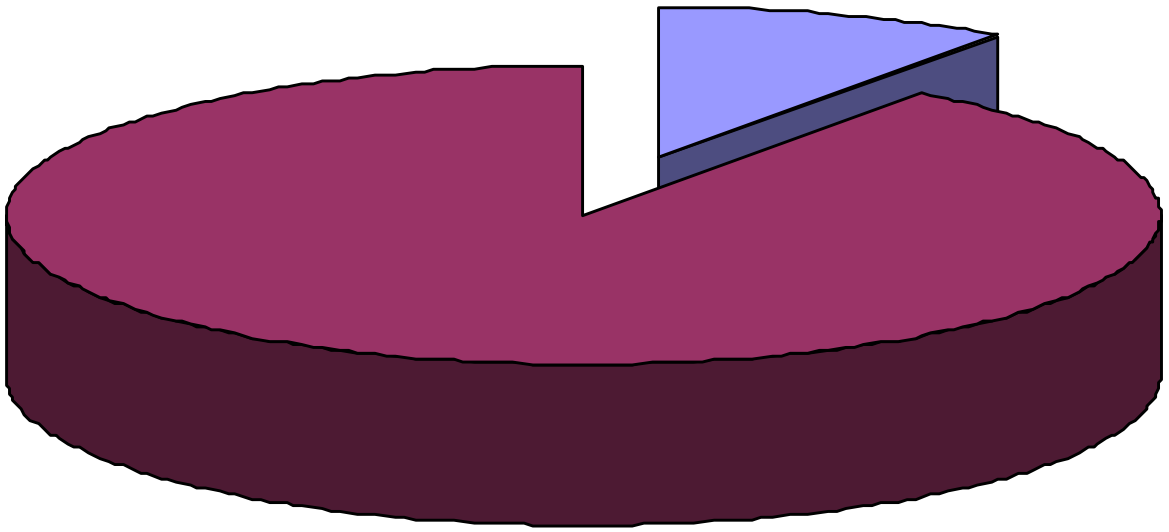








10% sociology



90% technology

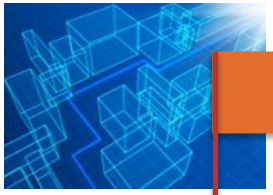
Maintaining a healthy body is a life-long mission

Health Planning


Continuous monitoring


Surgery & Treatment


Annual Check-up



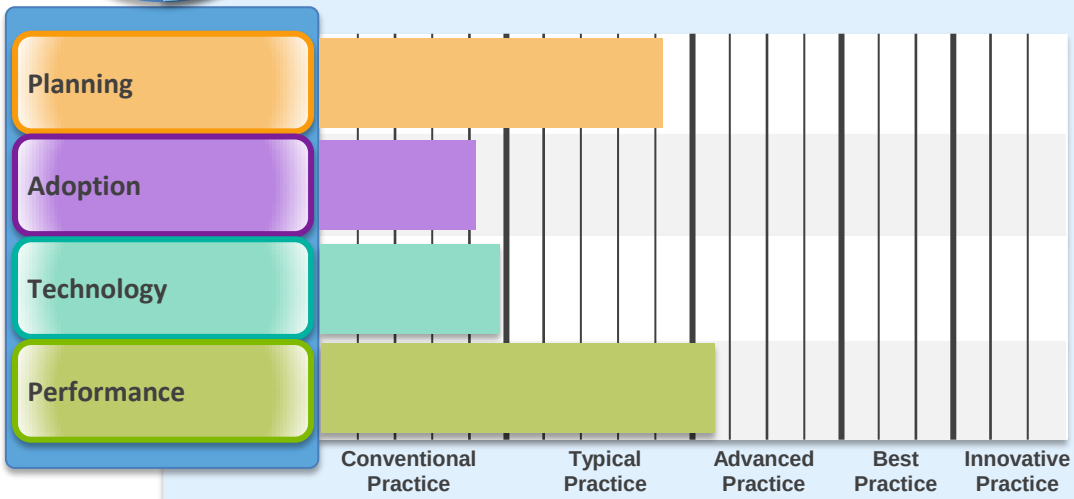
Maximizing BIM value is a life-cycle process

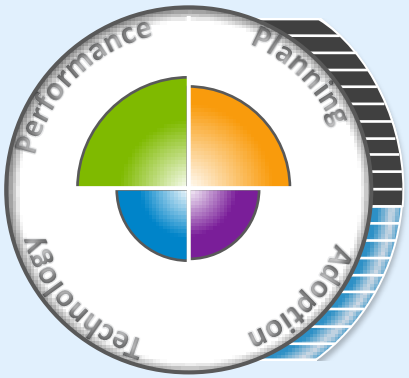
bimSCORE
goals

bimSCORE
evaluation, benchmark, advice and continuous improvements

bimSCORE
ROI
satisfaction

bim SCORE



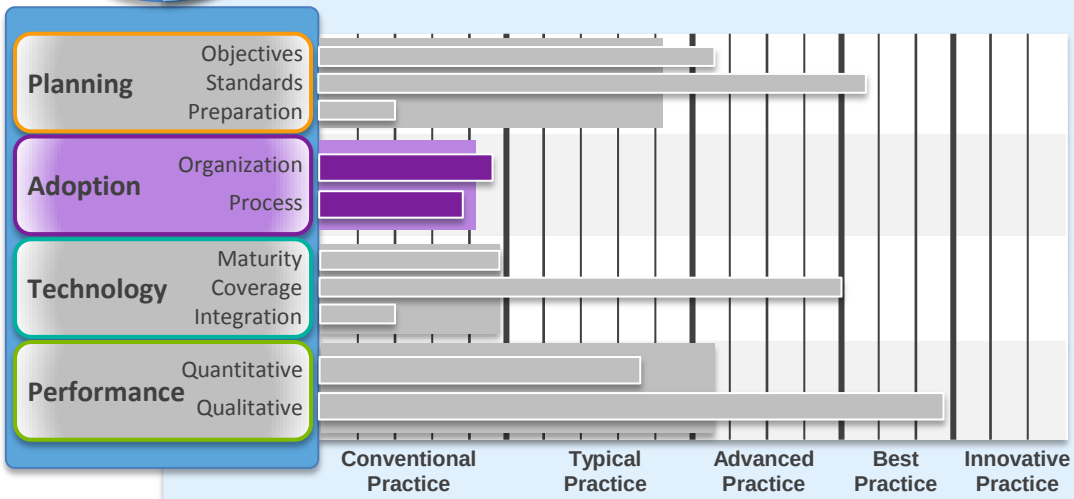


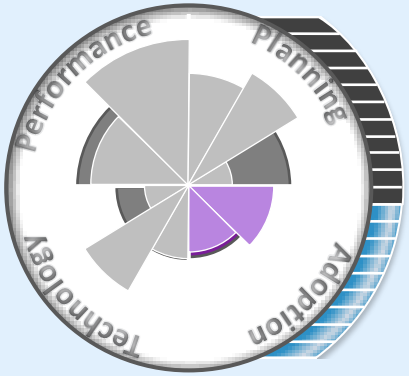
PROJECT OVERVIEW

Project Type: Office Building
Project Height: 30 levels above grade, 4 levels below grade.
Project Size: 50,000sqm
Project status: Completed in 2010, Started Concept Design in 2006

In terms of the degree of leveraging BIM in the building life cycle, this project is categorized as a mid range "Typical Practice".

bim SCORE



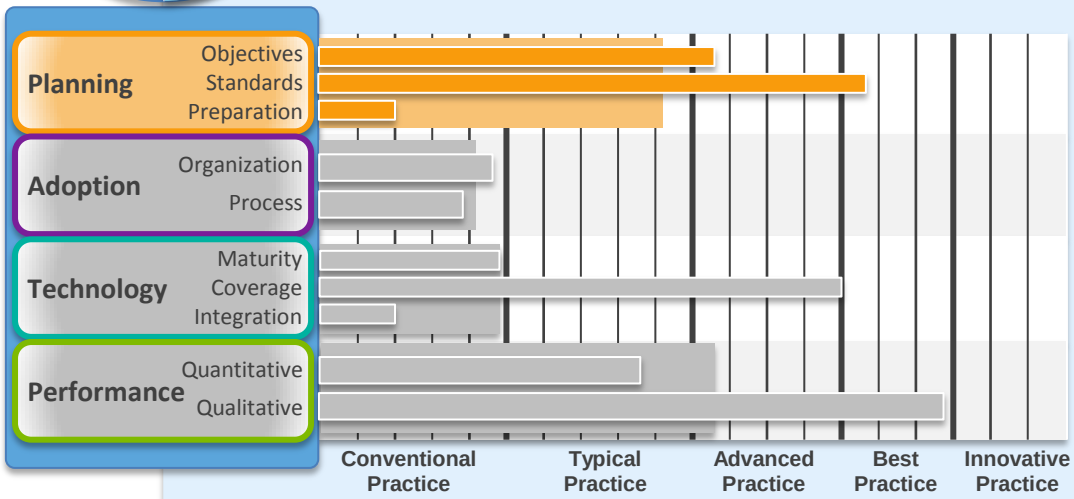


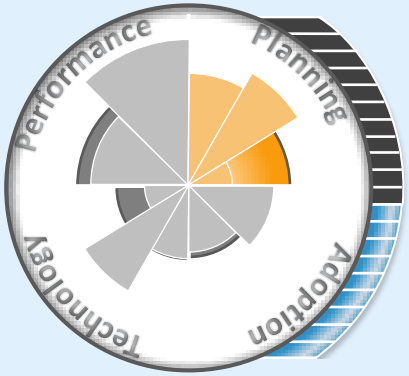
ADOPTION OVERVIEW

Owners started implementing BIM at the end of Design Development phase when most design decisions were made, clash free design is the holy grails for this project. There were two different BIM consultants engaged in the project, *BIM consultant A* was commissioned by the owners during the Construction Documents phase to ensure the designs from all disciplines are coordinated for the tendering phase. *The general contractor commissioned BIM consultant B* during the Construction phase per tender document's requirements to facilitate the construction process.

BIM should be applied to design phase as early as pre-design phase, where design decisions can be made with

bim SCORE





PLANNING OVERVIEW

Owner's project manager was the advocate for this BIM pilot project whom methodically established goals and standards to properly guide the implementation process. In the interview the PM claimed five objectives were the established, which includes:

1. Improve schedule conformance,
2. Improve cost performance by the reduction of on-site abortive works,
3. Improve construction safety,
4. Enhance the efficiency of information flow among project stakeholders, and

Issues 1: However it is uncertain if all these objectives were aspirations from the beginning of the project or a

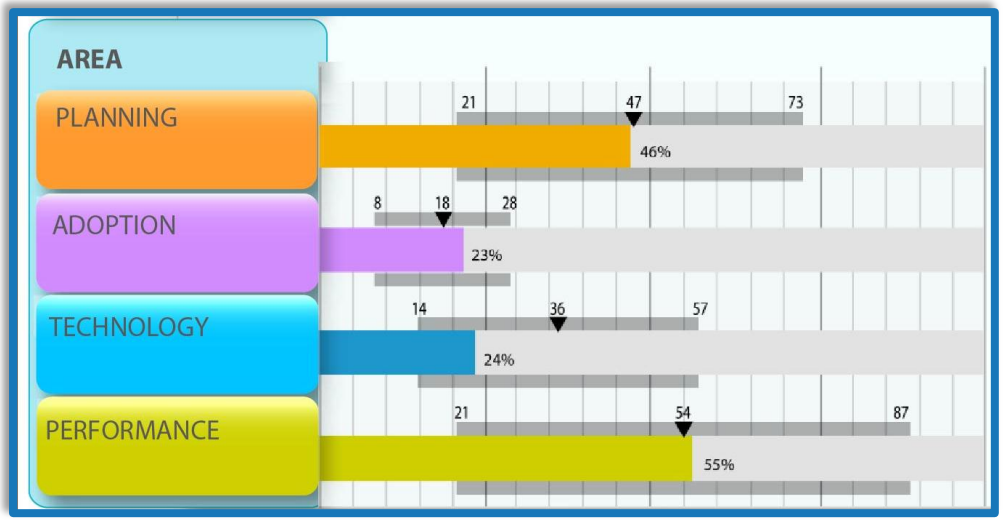
Benchmarking to the industry database

Projects are benchmarked using a database of the most **advanced and relevant** projects selected for review.

- World-wide project demographics data
- World-wide solutions knowledge base

Location	Project Type	Project Status	Area (sq.m.)	No. of Interviewees	Overall Score	Confidence Level
N. California, US	Medical	New Construction	20,000	3	80%	24%
Oregon, US	Federal Bldg.	Renovation	50,000	1	70%	21%
Arizona, US	Residential	New Construction	160,000	1	66%	24%
N. California, US	Medical	New Construction	25,000	1	57%	24%
Georgia, US	Lab	Expansion	10,000	1	54%	22%
Maryland, US	Office	New Construction	10,000	1	54%	25%
Mississippi, US	Federal Bldg.	Renovation	40,000	1	54%	23%

Scoring process begins by compiling a **cohesive view** of project preparedness and performance, using a **standardized mechanism** applied evenly to a worldwide portfolio of projects.



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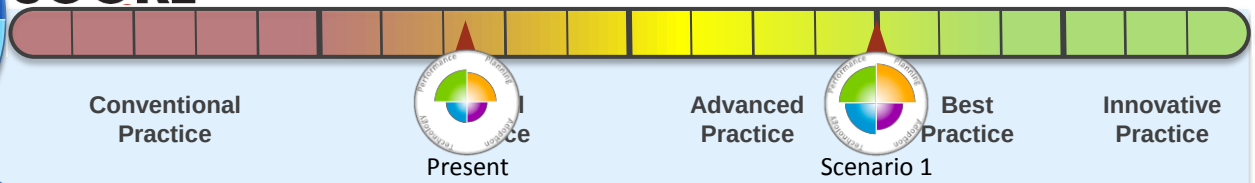
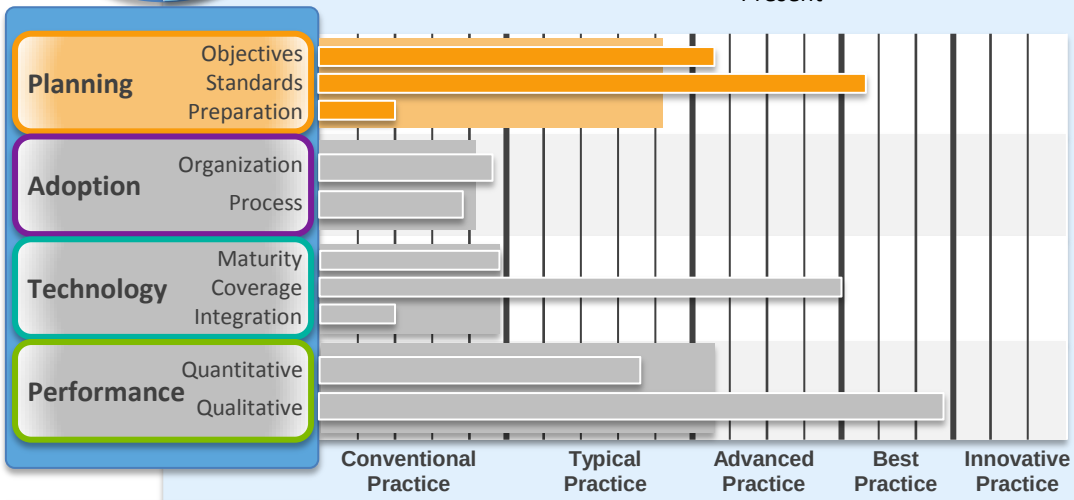
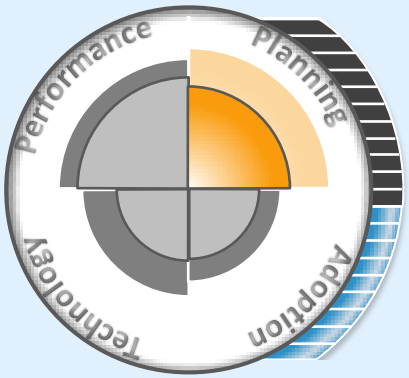






Benchmark

Scenario 1 +

PLANNING ADVICES

Advice #1

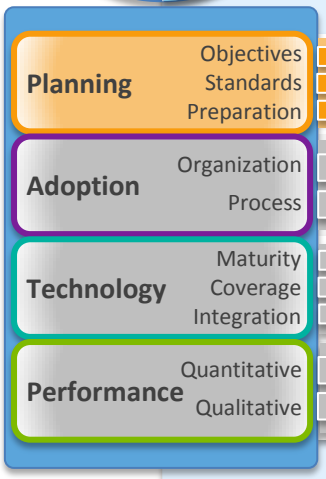
Owners should require the architect to use BIM as their design tool during the pre-design phase to provide accurate report on provided floor area with quick turn around time. Confidence in these numbers is crucial to the owners when an unexpected executive decision needs to be made, which could greatly impact and profitability of a project.

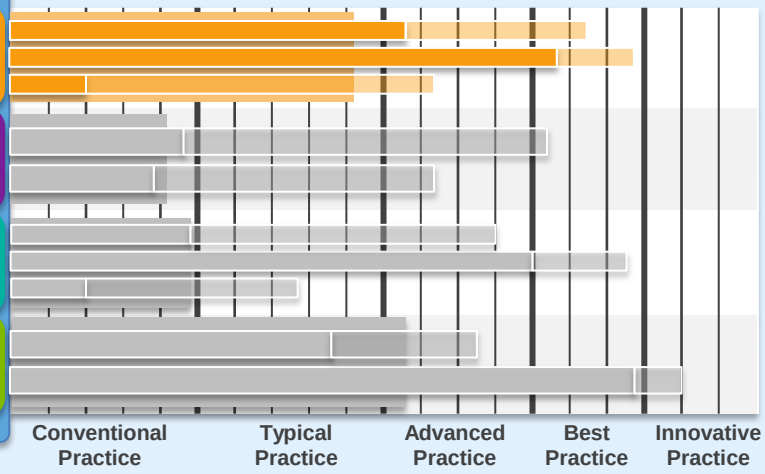
Advice #2

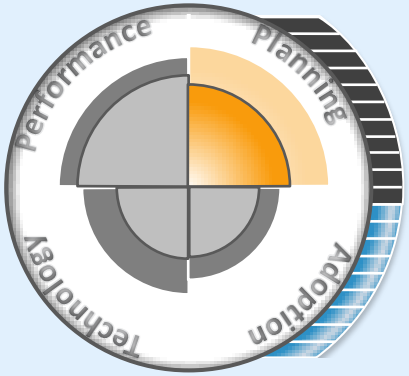
Owners should require at least one designated BIM coordinator for general contractor, architect and engineers, as the communicator on BIM related issues among disciplines (including BIM

bim SCORE

Conventional Practice | Present | Advanced Practice | Scenario 1 | Best Practice | Innovative Practice







Benchmark

Scenario 1 | +

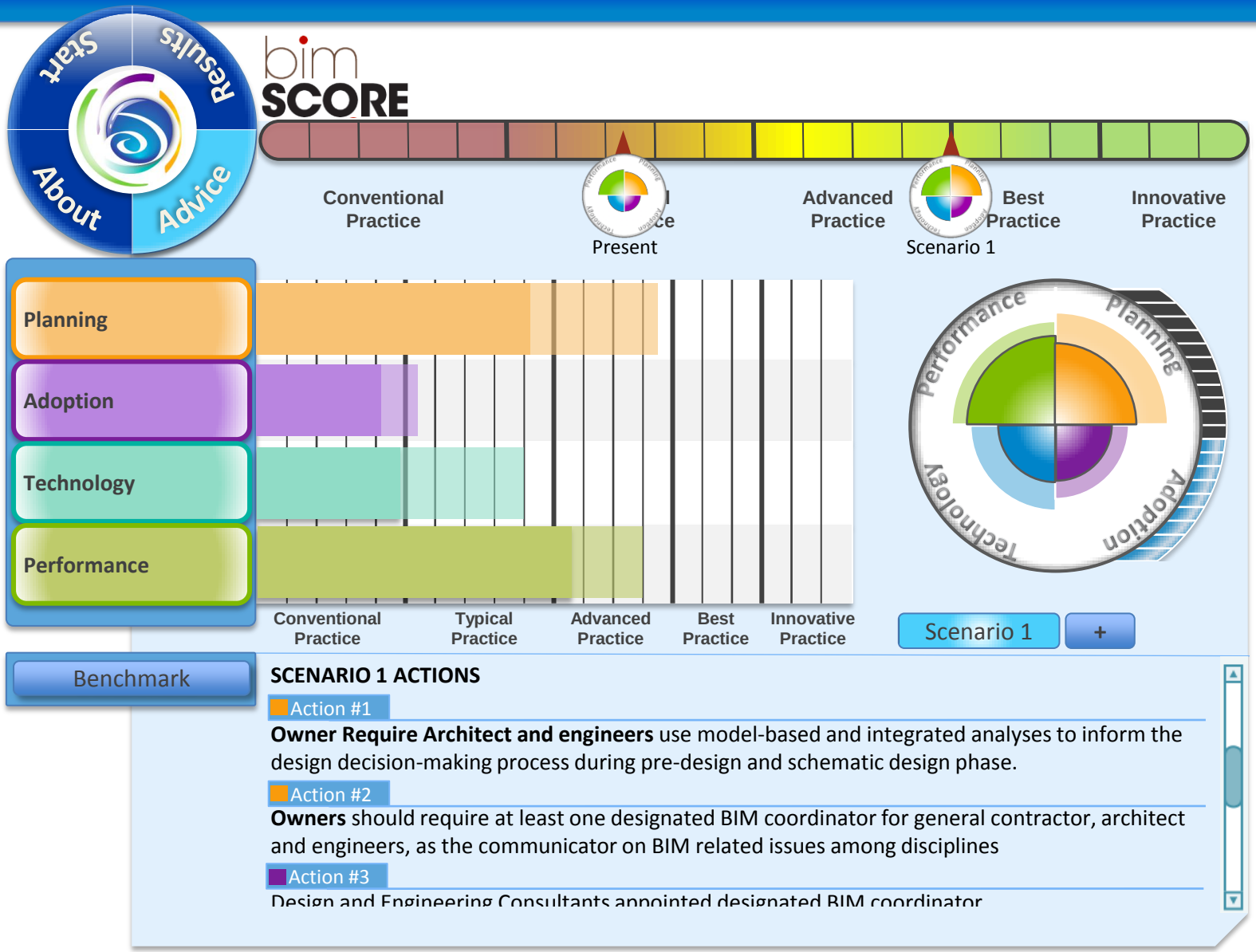
SCENARIO 1 ACTIONS

Action #1

Owner Require Architect and engineers use model-based and integrated analyses to inform the design decision-making process during pre-design and schematic design phase.

Action #2

Owners should require at least one designated BIM coordinator for general contractor, architect and engineers, as the communicator on BIM related issues among disciplines



bim SCORE

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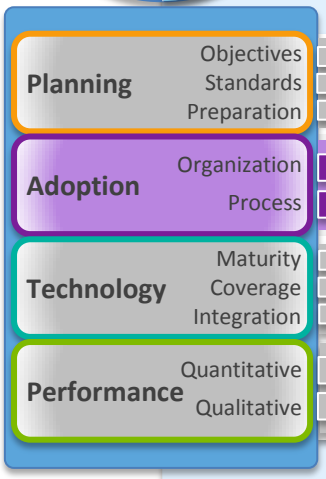
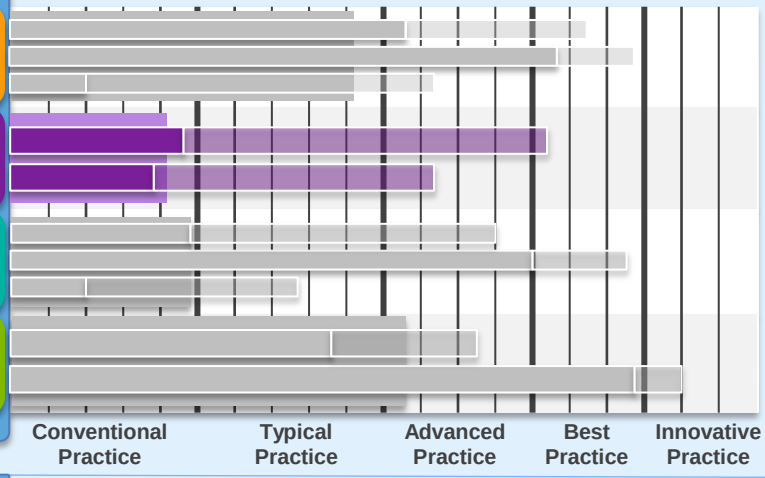
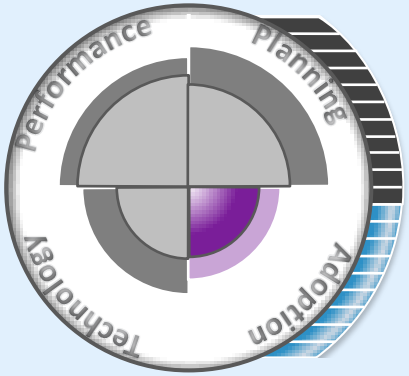






Scenario 1 +

Benchmark

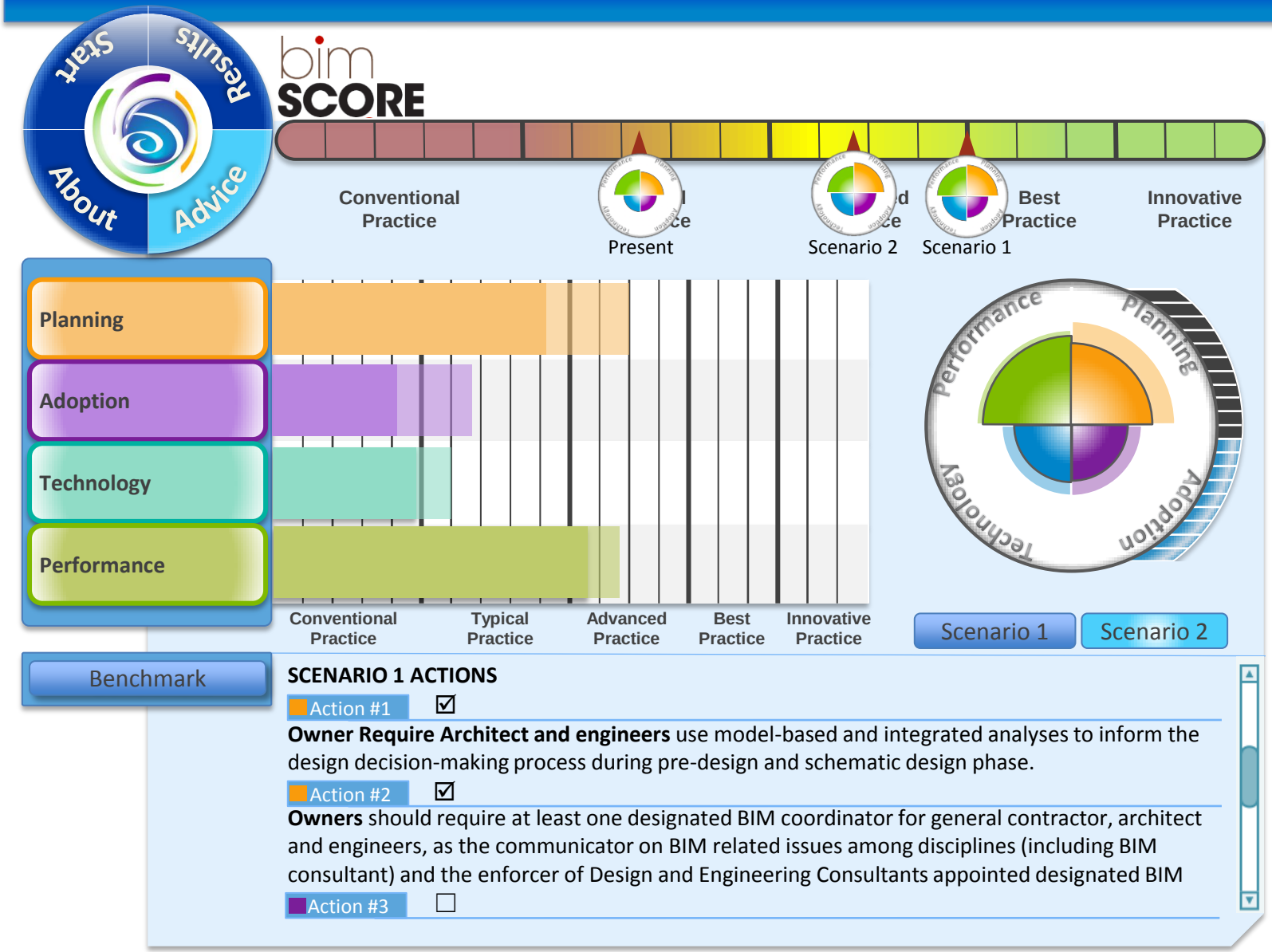
SCENARIO 1 ACTIONS

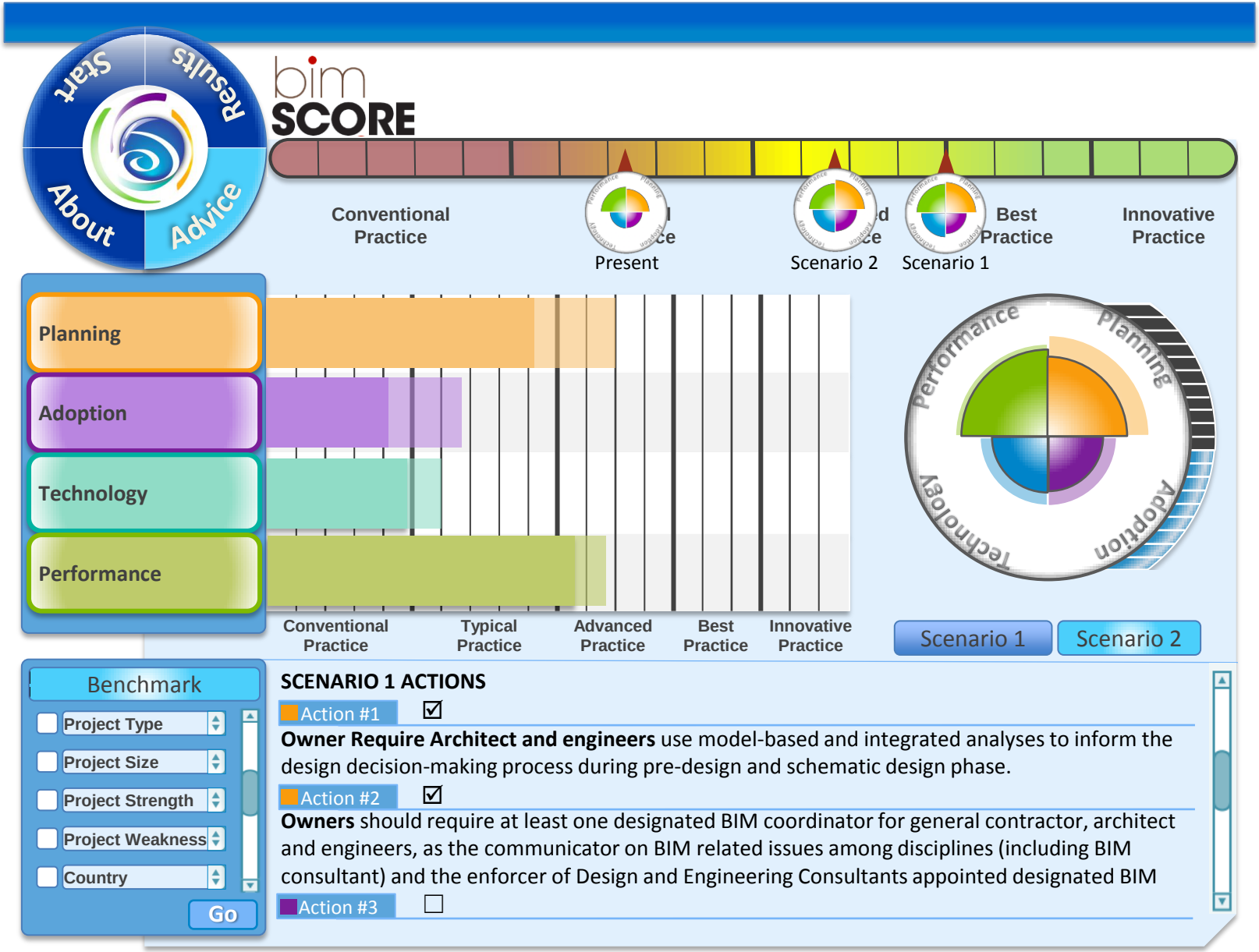
Action #3

Design and Engineering Consultants appointed designated BIM coordinator.

Action #4

FM managers participate in BIM coordination meeting to communicate info required to be embedded





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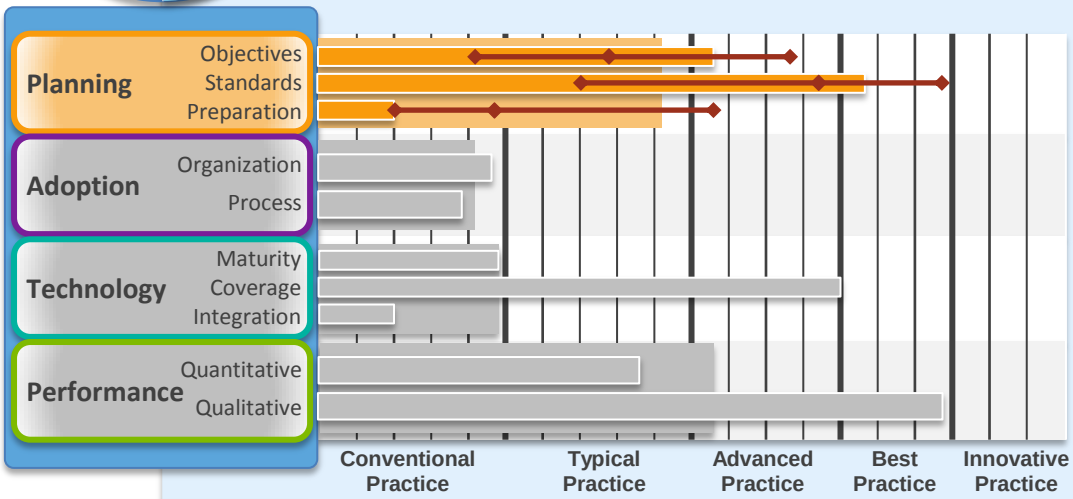

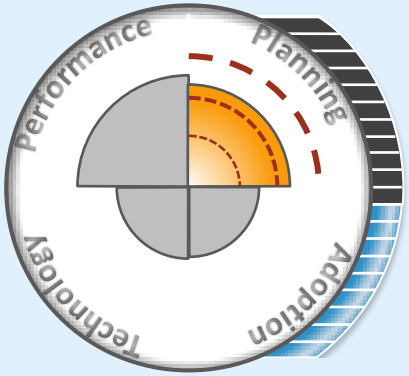

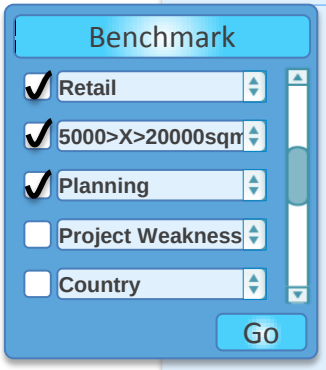

PLANNING ADVICES

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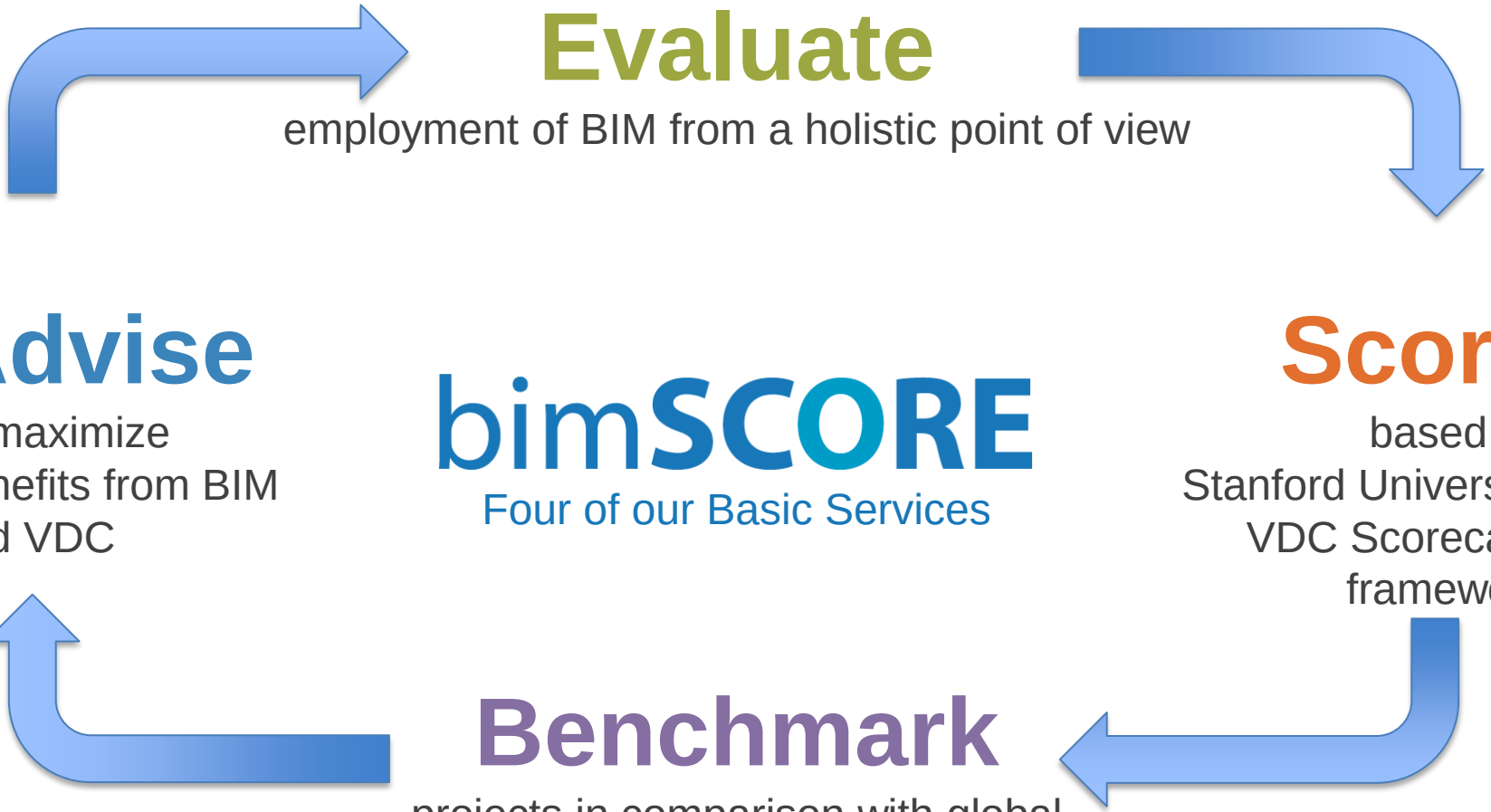

BIM Scorecard:
Measuring the Values of BIM

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Good design
makes a difference™
AIA

BIM Powered Decision Making

BIM Powered Decision Making

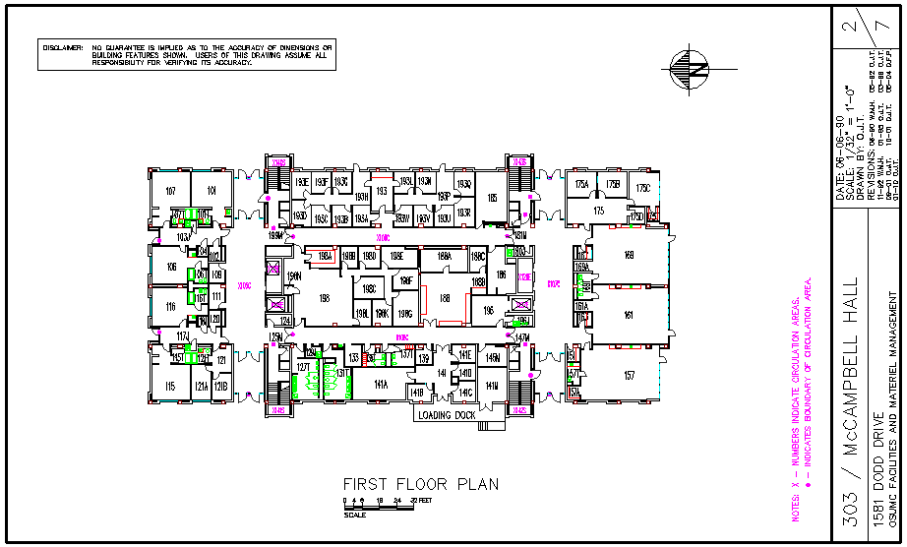
- **Joe Porostosky**
- Manager, Facilities Information & Technology Services, The Ohio State University Medical Center
- **Brian Skripac, Assoc. AIA, LEED AP BD+C**
- Director of BIM, DesignGroup

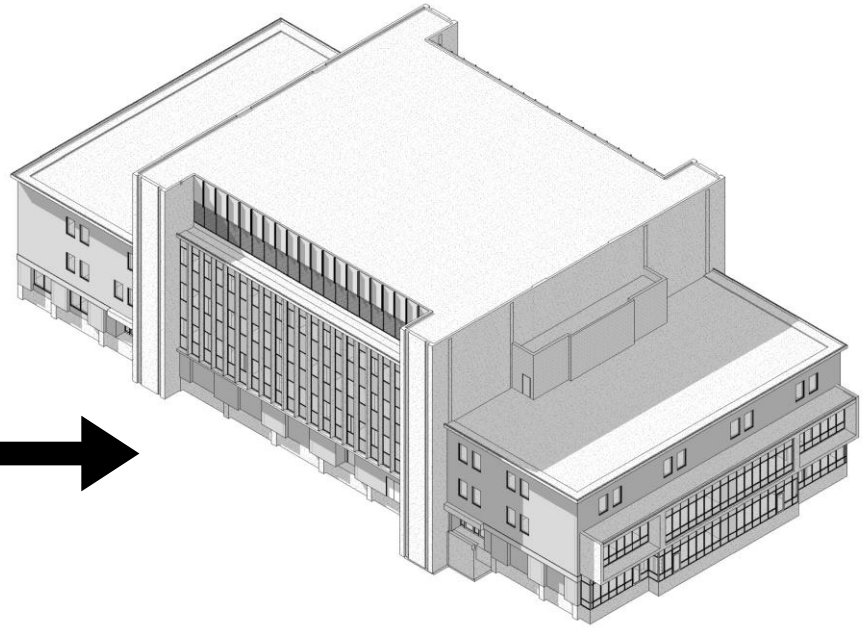
BIM Powered Decision Making

- Define the extended benefits of BIM at The Ohio State University Medical Center beyond design and construction.
- Explore the multi-phased approach to their defined BIM Implementation Plan
- Describe how The Ohio State University Medical Center and DesignGroup are partnering to deliver this project.
- Illustrate how BIM is improving the owner's decision-management process.

Project Background

- How was is done in the past?
- Why transition to BIM?





Planned Transformations…

- Enhance space planning and communication resulting in improved quality and speed of the decision-making regarding:
  - Facility use
  - Renovation
  - Maintenance
  - Wayfinding
  - Energy consumption

Project Definition

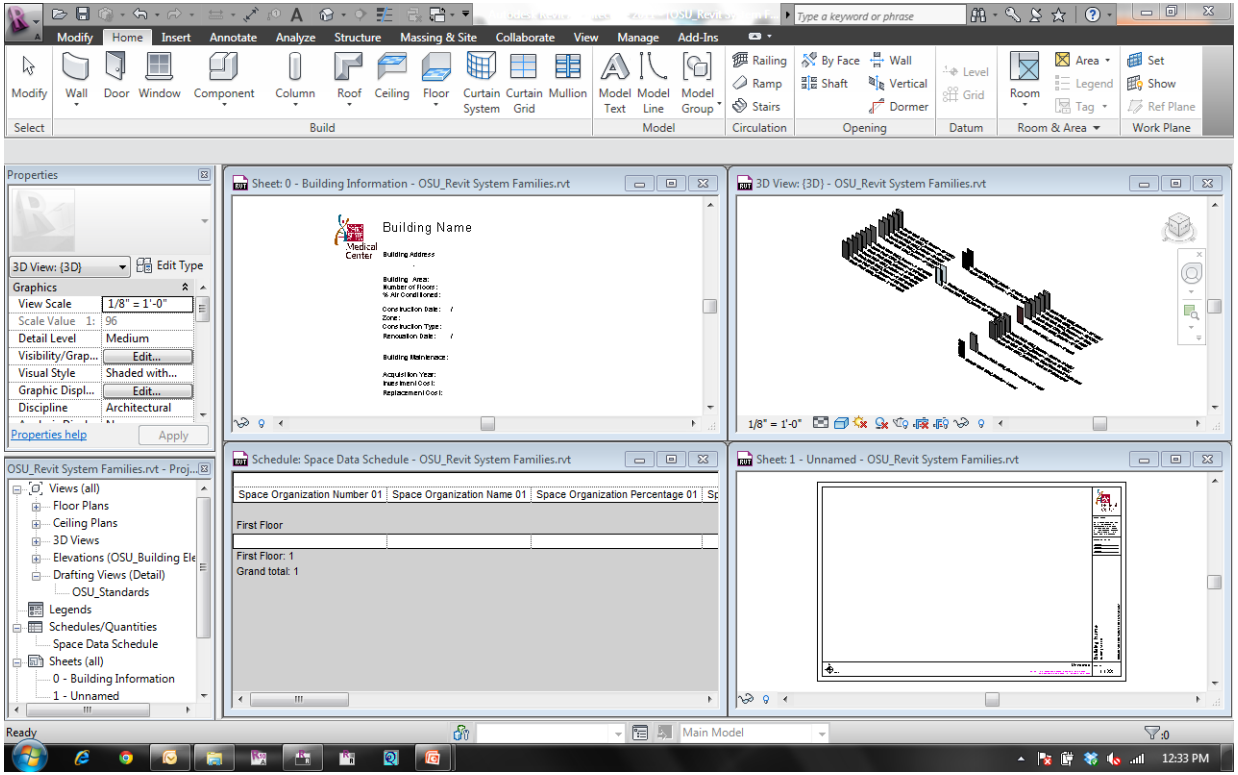
- Partnership & Collaboration
  - Teach a man to fish approach…
- Team Development
  - OSUMC
    - BIM / Project Manager (Facilities Space Analyst)
    - BIM Assistants (5 Full Time Students)
    - Existing Facilities Information and Technology Services Staff (Part Time)
  - DesignGroup
    - Director of BIM
    - BIM Thought Leadership Team

Project Definition: Multi-phased approach

- Phase 0
  - Standards & Template Development
  - Process Map and Workflow Integration
  - Training
  - Best Practices & Consulting
- Phase 1
  - Implementation – “Big Bang Approach”
  - 54 Buildings - 6,012,540 square feet
  - Includes basic building information: exterior, walls, windows, doors, columns, etc.
- Phases 2 and 3
  - Planned future detail to models.

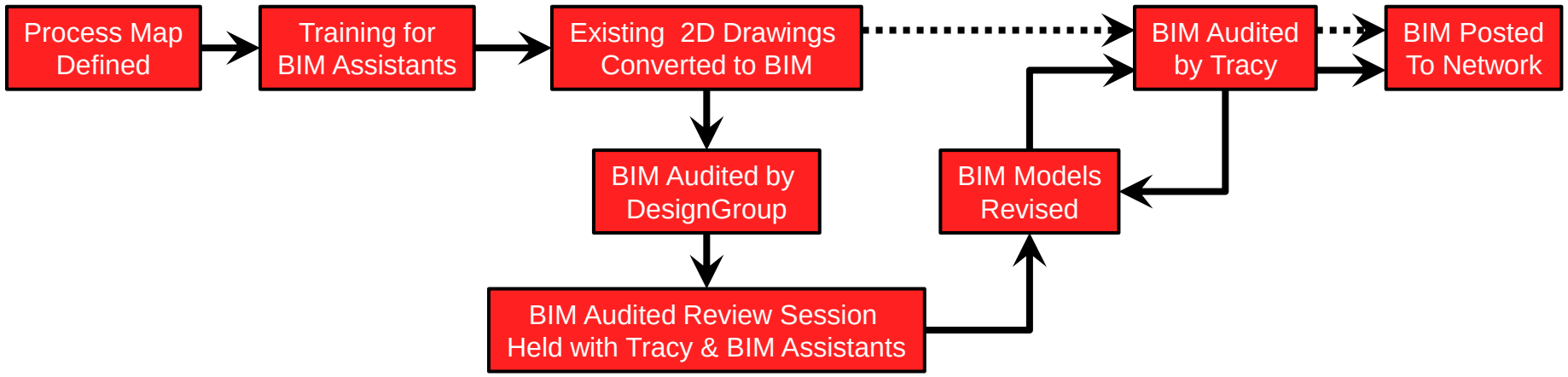
Phase 0

- Standards & Template Development
- Process Map and Workflow Integration



Phase 0

- Training for BIM Assistants & FITS Team
  - Hands-on customizing training
  - Based on process map and existing Medical Campus buildings

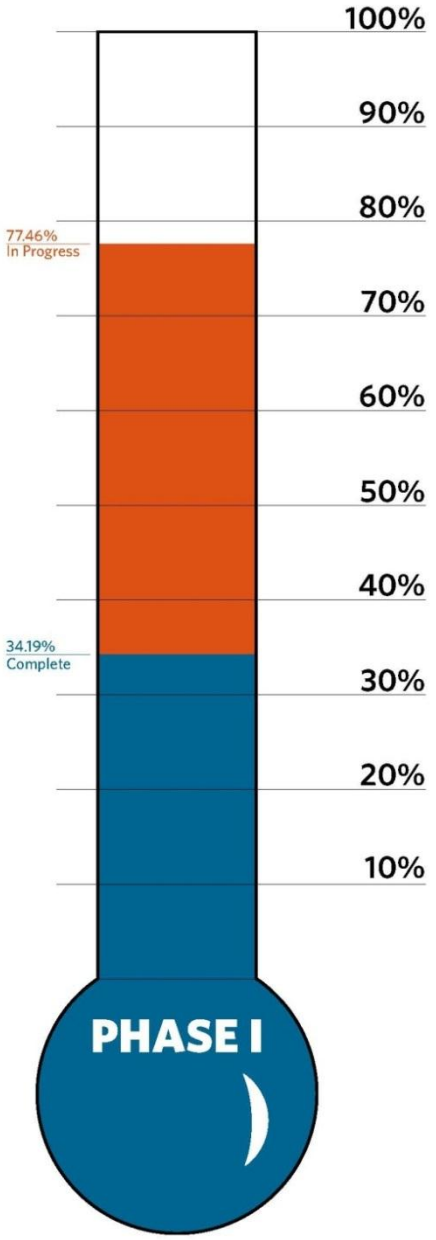


Phase 0

- Training
  - Engineering and Operations
  - Interior Designers and Space Planners
  - Construction Managers
  - Energy Analysis

Progress Update

- Status of Phase 1: *(as of 11/10/11)*
  - 16 buildings complete
  - 34 buildings in progress
  - 4 buildings yet to start
- Pace Expectations (minutes per sf)
  - Expected = .029
  - Actual (conversion only) = .035
  - Actual (with support staff) = .055

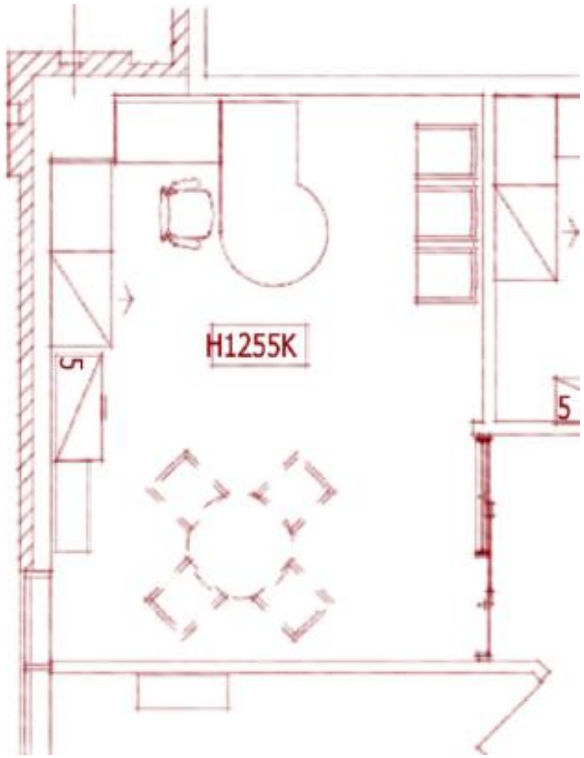


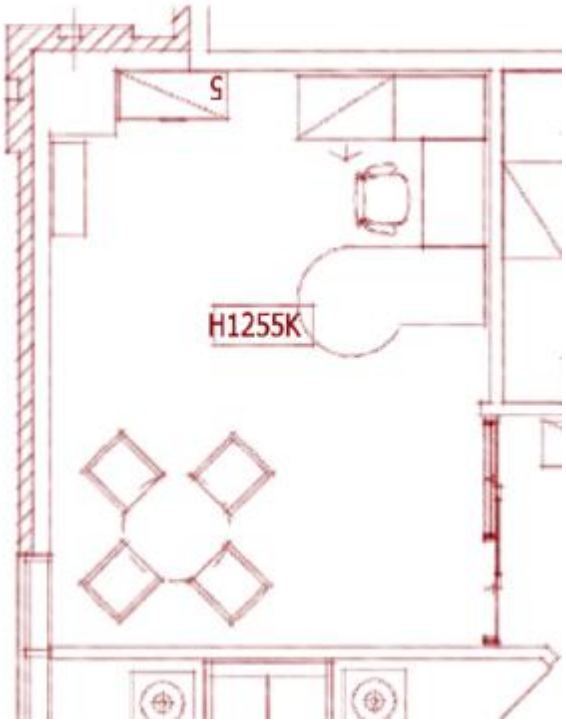
Initial Scope Changes

- Additional details moved from Phase 3 to Phase 1
- Higher level of focus on accuracy than expected
- Additional build out of the Revit file documentation
  - Increased usability by others
  - Sheet sets, 3D views, etc.
- Added rendering requirement for all buildings
- Several high profile projects

Outcomes – Renovation Decision Making

- Before





Outcomes – Renovation Decision Making

Outcomes – Renovation Decision Making

Outcomes – Funding Decisions

Outcomes – Funding Decisions

Outcomes – Donor Recognition Decisions

Outcomes – Donor Recognition Decisions

Outcomes – Donor Recognition Decisions

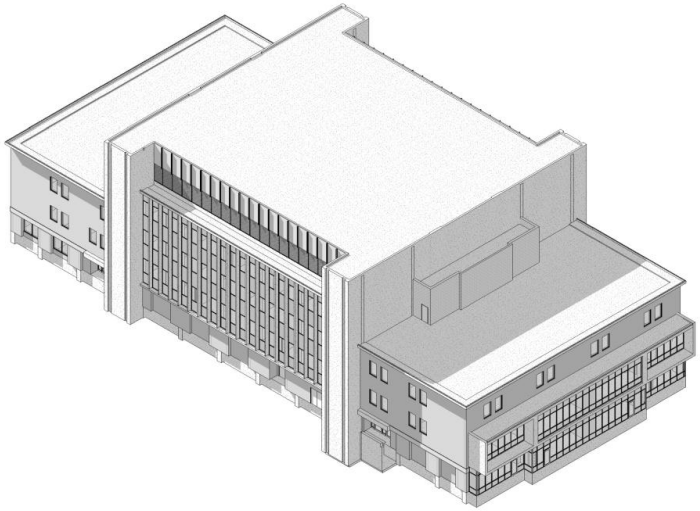
Outcomes – Customer Decisions

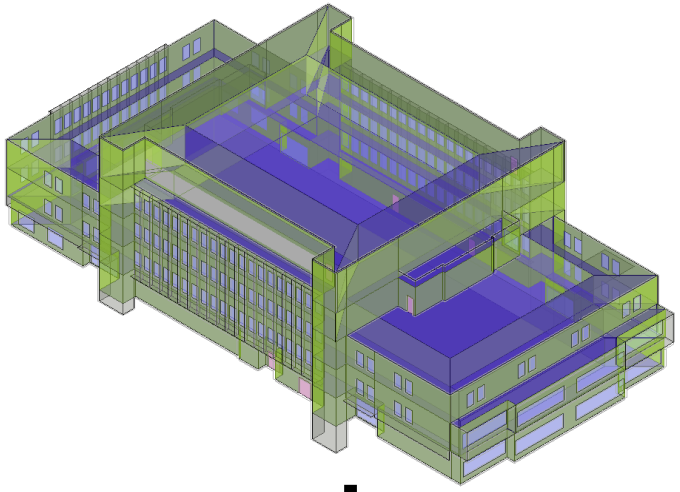
- Marketing efforts for upcoming renovations and additional facilities

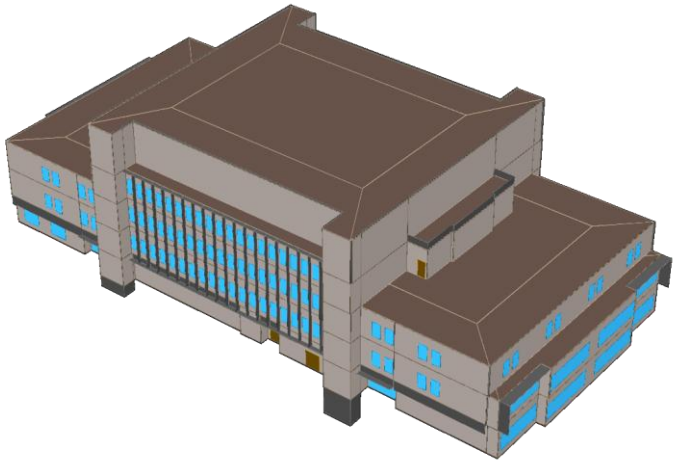
Outcomes – Accuracy Improvement & Data Additions

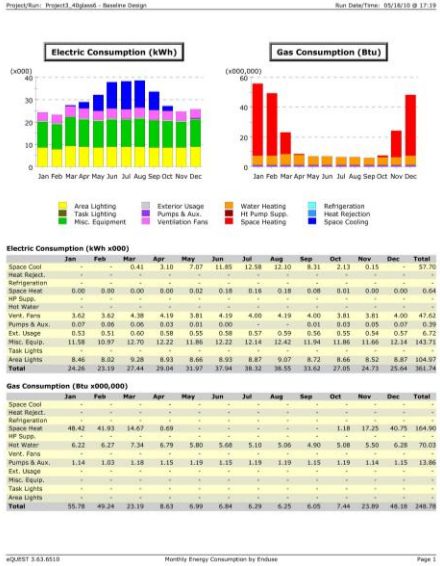
- Improved accuracy over AutoCAD
  - Original AutoCAD supplemented with field verifications, including 3-D laser scanning
- Additional level of detail added into BIM as opposed to AutoCAD
  - Exteriors, roofs, window placement
  - Height and volume
  - Ceilings and floors
  - GIS location data

Outcomes – Energy consumption analysis







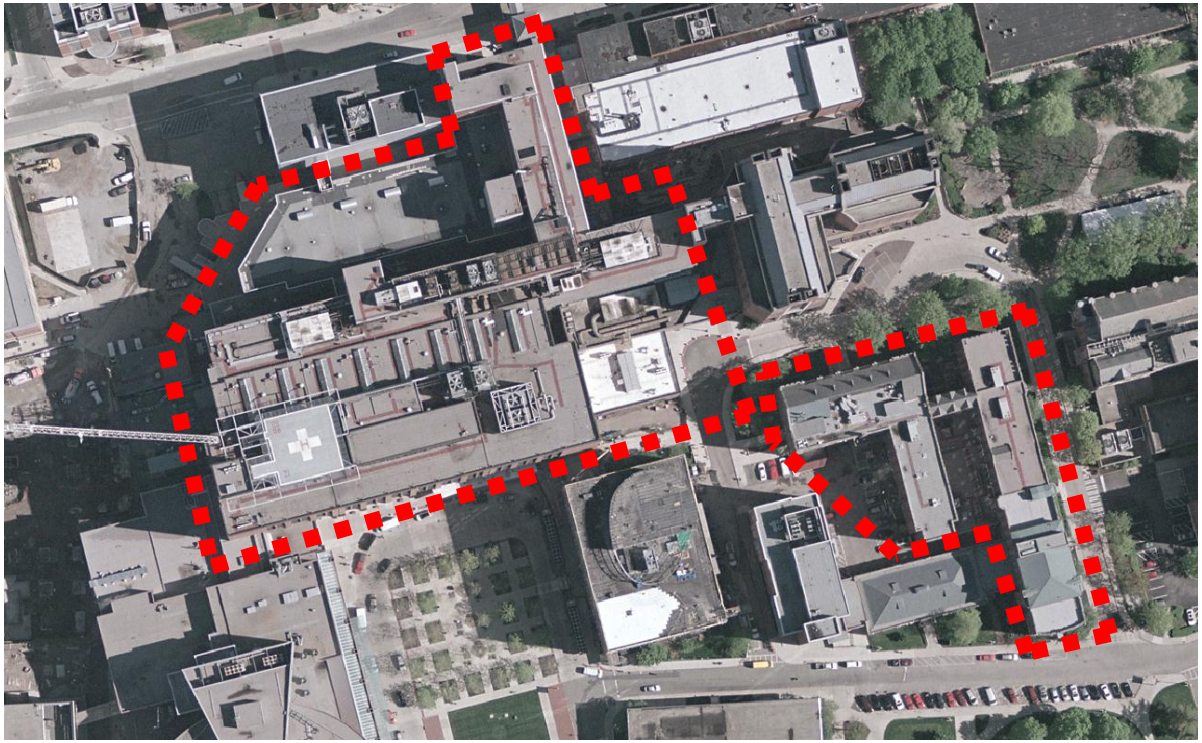


Future Outcomes

- Space Planning Decisions
- Improved Wayfinding
- Facility Maintenance
- ADA Compliance

Challenges Ahead

- Utilize 3-D Scanner
  - Supplement AutoCAD prints for Starling-Loving, Rhodes, and Doan (22% of space)



Challenges Ahead

- Complete Phase 1 in a timely manner
- Accelerate Phase 2 and 3
  - Capture additional levels of detail in the BIM
    - Fume hoods, casework, detailed plumbing fixtures
    - Signage; detailed ceilings, walls, windows; site information
  - Expected date of completion is August 2012

Lessons Learned

- Mutually Beneficial Experience…
  - What did OSUMC learn?
  - What did DesignGroup learn?

BIM Powered Decision Making

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